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JOURNAL OF THE INDIAN MEDICAL ASSOCIATION

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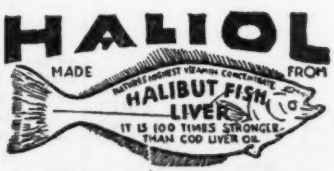

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HÆMATOLOGICAL STUDIES IN INDIAN WOMEN

*Preliminary Report on the Normal Erythrocyte Count, Hæmoglobin Value, Colour Index and Red Cell Diameter Determinations in Eighty-Six Normal Bengali Women.**

JYOTI DHAR, B.SC., M.B.
Calcutta

The value of erythrocyte counts, hæmoglobin estimation, colour index and red cell diameter determinations in the differential diagnosis of anæmias is well known. But the absence of correct normal standards for the number and hæmoglobin content of red cells and the inaccuracies of almost all the clinical hæmoglobin methods are great handicaps. That various factors, including age, sex, altitude, racial and geographical differences etc. influence the cell concentration in the circulating blood, has been established by the recent, accurate and laborious investigations of WILLIAMSON[92], BING[5], BIE and MOLLER[4], RUD[77], HADEN[25], GRAM and NORGAARD[21], KOMOCKI[43], OSGOOD[61], WINTROBE and MILLER[97],, WINTROBE[95], BROWN and BRIGGS[7], and other hæmatologists.

Unfortunately, for an examination so fundamental to clinical medicine as the blood count, no accurate data is up till now available upon which to base an accurate conception of the normal for the Indian women. The author has undertaken a study of the formed elements of the blood of normal healthy Bengali women, of different age groups, in order to secure a base line, primarily meant for comparison with the values in a group of cases of severe anæmia of pregnancy, studied under identical social, economic and racial condition, to be reported in a later paper. A base line of this character, as emphasized elsewhere[11], appeared to be essential in order to avoid misinterpretation which might result from uncritical acceptance of normal standards, developed in countries geographically and environmentally different from Bengal and racially different from the Bengali stock.

The results of an investigation which has been carried out on eighty-six healthy non-pregnant Bengali women, between the ages of sixteen and thirty-five, in order to furnish accurate data, from which to calculate normal blood standards, do not conform with the data available in the European, American and Japanese literature. As no work with the Bengali, and for that matter, Indian women has so far been reported and because much confusion has arisen from the use of arbitrary standards of hæmoglobin and red cell counts and lastly because no data of any previous Indian observer have been reported and thus subjected to statistical analysis, a preliminary report of this study and the first report of this nature in India, has seemed warranted. It is hoped that the publication of this work, will stimulate other Indian workers

*From the Chittaranjan Seva Sadan, Calcutta.
Submitted for publication, September 4, 1934.

to report a larger series of accurate examinations of blood of normal Indian women, in order that accurate normal figures on the blood may be computed therefrom.

Up to the time of writing this report, we have not come across any published data on the "Normal Blood" determination in the Indians. McCay et al[51] published a paper in 1907, in which they made the following amazing statements. "The red blood cells are more numerous in the Bengali than is the case in the Europeans. In over 80 per cent of the 156 persons we examined the average number of red blood cells was 5,300,000 compared with 5,193,000, the average of 113 observations on healthy European students (Stewart-Manual of Physiology). The Bengali's blood shows a very decided difference in the percentage of hæmoglobin compared with the normal European. Over 75 per cent of the 156 individual estimations showed only an average of 81 per cent hæmoglobin (Haldane's Carbon Monoxide Method)" The original data, on which the above statements were made, were not published by the authors. The subjects examined were Hindu *males* and were either students or servants (durwans, bearers, methars and domes) of the Medical College, Calcutta. The results of the present investigation do not corroborate the above statements.

Inspite of the fundamental importance of accurate knowledge in respect to the number of red and white cells and the amount of hæmoglobin in the blood of normal healthy persons, it is surprising to find on what poor foundation the accepted standards have been based. Few medical men are aware that the usually accepted conception of the figures at present accepted as normal blood count, in men and women, are based on the determinations carried out, by inaccurate and obsolete methods, in the middle of the nineteenth century, on four subjects by Vierordt[86] and Welcker[90] in 1852 and 1854 respectively. Bie and Moller[4] stated that the figures for normal red cell counts (five millions in men and four-and-a-half millions in women) are based on the work of Vierordt and Welcker, each of whom examined only two subjects. It is only recently that the validity of drawing conclusions on the basis of only a few observations was questioned by Osgood[61], Osgood and Haskins[63], Wintrobe[95] and Brown and Briggs[7] and an attempt was made to supply a large series of observations on healthy men and women.

Likewise, the wide variations in the amount of hæmoglobin accepted as the equivalent of 100 per cent by the various authors and instrument makers (of hæmoglobinometers) reflect the inaccurate foundation on which they depend.

Until recently no large series of blood determinations have been available for the fixation of normal standards and in view of the variations mentioned above, further accurate determinations are desirable. This lack of accurate standards, writes Musser and Wintrobe[57], has resulted in the employment, as the equivalent of 100 per cent of hæmoglobin for various instruments, of values ranging from 13.8 grams to 17.2 grams and even 21 grams per 100 c.c. of blood. This deplorable lack of uniformity, writes the authors, makes it difficult to compare hæmoglobin values determined by different instruments. This is still further aggravated by a rather general carelessness on the part of the manufacturers in the calibration of instruments. Fortunately there is now an increasing tendency (especially amongst the American hæmatologists) to report hæmoglobin values in grams per 100 c.c. of blood (rather than in percentages). This makes for greater accuracy. Some of the modern American instruments now give hæmoglobin values directly in grams. Of these, the Haden-Hausser Hæmoglobinometer is the latest and the most accurate instrument.

Both the quantity of hæmoglobin and the number of red cells are variables, depending upon the age, sex, climate, food, exercise and barometric pressure. Dowden et al[14] examined the blood of one patient, daily for a month and hourly for a day and found the red blood count to vary from 5,128,000 to 6,176,000 and the hæmoglobin from 11.3 grams to 15.3 grams. The authors advocate abolition of such terms as "normal averages" and recommend the use of "a normal range" for hæmoglobin and red blood cells, as is done for chlorides, sugar,

cholesterol and the nitrogenous products of the blood.

Amongst the various European and American workers on the subject, there have appeared variations in the mean normal values for the erythrocyte count as well as for hæmoglobin.

Survey of the Literature

No exhaustive survey of the literature has been attempted. The most important studies, however, are included in the body of the paper. The first study of hæmoglobin by modern methods was made by Williamson[92] in 1916. The literature prior to that date has, however, been cited and the important studies since then been included.

Subjects Examined

The subjects, in this series, consisted of normal healthy female students of Ashutosh (sixty-five) and Bethune (twelve) Colleges, Calcutta, selected healthy probationer nurses of Chittaranjan Seva Sadan (three) and Dufferin (two) Hospitals and healthy female relatives (four) of the indoor patients in the former hospital. The number of subjects examined were one hundred and nine non-pregnant Bengali women. Of these, eighty-six subjects have been accepted as normal; their ages varying from sixteen to thirty-five years. All the subjects were born of Bengali parents and brought up in Bengal. None were domiciled outside Bengal. No organic disease was suspected in any of these subjects. These subjects, we believe, furnish a fair cross-section of the Bengali women population of this age. Each subject, herein reported, was considered to be perfectly healthy at the time the blood was drawn and subjects suspected of ill-health (twenty-three in number) were excluded from the present study. The blood was drawn generally between 9 A.M. and 5 P.M., throughout the greater part of the year—thus offering a fair check against any normal diurnal and seasonal variations.

No selection was made with reference to the menstrual period. Thus the possible influence of menstruation has not been considered in this series. It will be considered in a later paper.

Normality of Subjects

Dowden et al[14] pertinently raises the question as to what is "normal blood" and what is a "normal subject". An individual may be subjectively healthy with perfectly normal functional tests of all kinds and still have comparatively low hæmoglobin value and red cell counts. Such findings are not uncommon among nurses, technicians, secretaries etc. and such individuals constitute a large percentage of the so-called "normal" series. Conversely, the authors add, an individual may have advanced heart, kidney, lung, gastro-intestinal or other pathological conditions with blood examinations much nearer the generally accepted normal average than the class previously mentioned. These individuals cannot be used in the "normal" series and have been excluded from the present one.

Analysis of the Subjects

The ages of these women, varied from sixteen to thirty-five years, with an average of 20.58 years. The distribution of the subjects, according to their age is presented in Table No. 1.

Table 1

Showing age-distribution of the subjects

Women	16-18 years	19-21 years	22-25 years	26 years & above	Total
Number	34	29	14	9	86
Per cent	39.53	33.72	16.27	10.46	

Of the 86 women studied, the great majority were unmarried; a fair proportion of them were widows, and the rest were married. The distribution of subjects, according to whether they were single, married or widows, is shown in Table No. 2.

Table 2

Showing distribution of subjects, according to the marital state

Women	Single	Married	Widow	Total
Number ..	47	15	24	86
Per cent	54.6	17.5	27.9	

The great majority of the subjects were non-parous women; only 22 per cent were

parous women. Table No. 3 shows the distribution of the subjects according to their parity.

TABLE 3

Showing distribution of the subjects, according to parity

Women	Non-Parous	Parous	Total
Number ..	67	19	86
Per cent ..	77.9	22.1	

METHODS

The subjects were examined, as soon as (but not within three hours of any meal) they presented themselves at the laboratory; for HAWK[31] and WALTERS[87] have shown that both muscular activity[31] and rest[87] produce significant fluctuation in the erythrocyte count.

WALTERS[88] in a recent paper, compared the red cell count and hæmoglobin values, in eighty healthy men, between the ages of 20 and 30, determined after half-an-hour period of inactivity in the recumbent position, with those of eighty other subjects sampled at random uncontrolled activity. He found a significantly lower red cell count and hæmoglobin values in the resting subjects. Similar observations were made on twenty men, first after random activity and then one hour later, after complete muscular inactivity in the recumbent position. Red cell count and hæmoglobin values showed a significant decrease following inactivity.

The mechanism involved is not very difficult to understand. The spleen acts as a store house, capable of increasing the oxygen-carrying capacity of the blood by the extrusion of considerable quantities of red cells. The lower figures after muscular inactivity indicate an absolute decrease in circulating red cells, owing to withdrawal of cells into storage. The decreased red cell content in resting persons represents the converse of erythrocytosis that occurs in exercise or emotion, both types of adjustment reflecting a delicate balance, which appears to adapt the oxygen-carrying capacity of the circulating blood to the requirements of the tissues.

The importance of Walter's findings lies in the fact that blood-examinations (for diagnostic purposes) are done with the patients in complete rest. The possible influence of enforced inactivity (due to illness) needs to be taken into account in the interpretation of the red cell count and hæmoglobin values. This is also true in relation to older persons of extremely sedentary habits and to Indian women (especially of the "pardanashin" class) who lead an extremely sedentary life. Both are likely to exhibit low blood-counts.

The examinations were done throughout the entire day, especially in the forenoon and the afternoon, and extended over the greater part of the year (1933 to 1934), so that the averages eliminate the diurnal and seasonal variations. Blood samples were obtained by puncturing the middle finger of the right hand, with a quick stroke, with a sharp triangular cutting needle and sufficiently deep to produce a spontaneous flow of blood. The first drop or two of blood was discarded, the succeeding drops flowed freely, so that no squeezing was necessary.

All the determinations were made by the author himself and the same red blood cell pipettes, the same counting chamber (for total counts), and the same hæmoglobinometer were used in the present series. The pipettes, the counting chamber and the hæmoglobinometer were previously standardized—thus ensuring uniformly standardized results.

The red blood cell pipette (Thoma) was calibrated and standardized by Carl Zeiss. Thoma's counting chamber, standardized by Leitz, was used. Hayem's fluid was used as the diluting solution for the red blood cell counts. In order to ensure accuracy of counts, the practice of WINTROBE[95] has been followed in this study. "Two separate dilutions of blood were made (in different pipettes) and the resulting counts were not accepted unless they agreed within 100,000—the average of two such counts being taken as the result."

Hæmoglobin was estimated by the modified Sahli acid hæmatin method. All the read-

ings were made by daylight. The new Sahli apparatus was standardized by Hellige, according to the VAN SLYKE's[84] oxygen capacity method. The colour standard used was the permanent non-fade double (one, on either side) tinted prisms which were standardized (along with the Sahli tube), so that Sahli value 100 was equivalent to 17.2 grams of hæmoglobin per 100 c.c. of blood. According to SCHWENTKER[80], this instrument can give a maximum error of five to seven per cent. The latter has further shown that forty minutes interval, between mixing the blood and decinormal hydrochloric acid and taking the reading, gives the maximum (colour of acid hæmatin) results. MYERS[58], however, allows the mixture of blood and decinormal hydrochloric acid to stand for two hours; as according to him, "full colour of acid hæmatin does not develop until this period has elapsed". In the present series, we have followed the "forty minutes interval" method. The hæmoglobin has been reported in grams per 100 cc. of blood. It is important to realize, writes WINTROBE[95], that even after careful re-calibration of one of the more accurate hæmoglobinometers, a rather considerable degree of error may be present. The error resulting from the placid acceptance of the manufacturer's statement that 100 per cent is equivalent to a certain number of grams of hæmoglobin is, however, much greater.

The mean diameter of the red cells was determined by the diffraction method, with the Eve's Halometer. The result was checked by comparison with the figure obtained by the micrometer disc. Expressing the statistical view, regarding the reliability of halometry, CHOUDHURY[9] writes: "there is hardly any difference between the results of the two methods (Halometry and Price-Jones curve) for measuring the average diameters of red blood corpuscles. The halometer can therefore be safely relied on". PRICE-JONES[75] writes: "The limitation of all these instruments, in common with the colour-index and volume-index methods, is that they measure the size of the corpuscles in mass and give average figures only; the details of the distribution are not known, and the variability cannot be accurately determined. But the diffraction method is obviously very convenient for quickly finding the mean diameter, especially in comparative rather than in absolute terms."

The total and differential leucocyte counts (including those of Arneth and Schilling), in the present series, showed interesting variations from the accepted normal figures of the European and the American hæmatologists. The average total count in Bengali women was lower than the European and American figures. In the Schilling count, the normal hæmogram in the Bengali women showed a "shift to the left" when compared with European and American normal figures. The ratio of the non-segmented to the segmented forms, in the normal hæmogram for the Bengali women was in the proportion of 1 in 4, to 1 in 6, instead of 1 in 14, to 1 in 16 as found in the Europeans and the Americans. These figures will be statistically analyzed and presented, in a more detailed manner, in a separate paper.

MODERN HÆMATOLOGY

Modern hæmatology has its humble beginning in the middle of the nineteenth century and the names of FUNKE, VIERORDT, WELCKER, PREYER, MALASSEZ, HOPPE-SEYLER, GOWERS, HAYEM, LEICHTENSTERN, EHRLICH and HEDIN[28] are closely associated with the discovery of the fundamentals of the science. VIERORDT[86] in 1851, first enumerated the red blood cells and thus stimulated work in blood counting. MALASSEZ's[50] monograph on the enumeration of red cells appeared in 1873. GOWERS[19] devised his counting chambers in 1877. Hæmoglobin was discovered and isolated in crystalline form by FUNKE[17] in 1851 and WELCKER[89] in 1854, made the first clinical estimation of hæmoglobin. HOPPE-SEYLER[37], who showed that hæmoglobin combines with oxygen in the lungs to form oxyhæmoglobin, which in turn gives up the oxygen in the tissues again to form hæmoglobin, proved the fundamental importance of blood pigments in tissue metabolism.

PREYER[71] published his monograph on the blood pigments in 1871, while the first monograph on clinical hæmoglobinometry was published by LEICHTENSTERN[46] in 1878. "The size, the number, the volume, the surface and the colour of the blood corpuscles of man and animals" was published by WELCKER[91]

in 1864. The first clinical hæmatology by HAYEM[32] appeared in 1878. LAACHE'S[44] classical monograph on anæmias was published in 1883.

The introduction of EHRLICH'S[16] method for staining blood films with aniline dyes, opened an entirely new field for the investigation of the blood and made possible the morphological study of different types of blood cells. The final chapter in the development of the fundamental methods for hæmatological study was HEDIN'S[33] introduction of the hæmatocrit, in which centrifugal force was utilized to seperate the blood cells from the plasma. An excellent presentation of the subject may be obtained from Cowdry's special cytology.

HÆMOGLOBIN

The inaccuracies of various methods of determination of hæmoglobin have been emphasized by OSGOOD and HASKINS[60], KARSHAN and FREEMAN[40], HADEN[24, 25], LINDSAY, RICE and SELLINGER[47], ROBSCHEIT[76], WINTROBE[95], BROWN and BRIGGS[7] and other eminent hæmatologists.

TABLE 4

Showing 100 *per cent equivalent, in grams, of different hæmoglobinometers*

Name of Instrument	Percentage Value	Grams, per 100 c.c. of Blood
Sahli (original)	.. 100 per cent.	17.20 Gm.
Sahli (New)	.. 100 ,,	14.50 ,,
Newcomer (Williamson)	100 ,,	16.02 ,,
Haden ..	.. 100 ,,	15.60 ,,
Dare ..	.. 100 ,,	13.77 ,,
Oliver ..	.. 100 ,,	15.00 ,,
Fleischl-Meischer	.. 100 ,,	15.80 ,,
Talqvist's Scale	.. 100 ,,	15.80 ,,

BROWN and ROWENTREE[8] wrote in 1925 as follows: The normal standard of hæmoglobin is as yet unsettled; this is surprising in a substance so important. OSGOOD[61] wrote thus in 1926: When our attention was first directed to this problem in 1919, we too were surprised at the scarcity of work on the subject. A study of the available methods of estimating hæmoglobin explained everything. These methods are either too inaccurate for research purposes or so technical and time consuming that the labour involved in studying an adequate number of cases was prohibitive.

DOWDEN ET AL[14] in 1934, gave the figures of some of the current makes of hæmoglobinometers. Table No. 4 is modified from his figures.

It seems unnecessary, writes DOWDEN[14], to further stress the great importance of reporting the amount of hæmoglobin in grams per 100 c.c. of blood; but the citation of a few of the existing errors will not be amiss. "For instance, one of the Sahli instruments is so graduated to indicate 100 per cent hæmoglobin as containing 17.2 Grams, one of the Dare instruments to contain 13.8 Grams of hæmoglobin, representing a difference of more than 20 per cent; perhaps better shown by the equation, viz.

17.2 Grams = (Sahli).. 100 per cent.
17.2 Grams = (Dare).. 124 per cent.

It should be known also that there is a wide difference in various Sahli, as well as, Dare instruments. Certainly, percentage reports are meaningless and even when accompanied by the name of the method used are not accurate, unless such instrument has been standardized, with one of the more accurate methods.

KOLMER and BOERNER[42] wrote in 1931: None of the methods in common use can be recommended from the standpoint of absolute accuracy. Owing to a variety of methods and standards the estimation of hæmoglobin in per cent is probably of the least value in the routine blood examination. Widely varying results may be reported therefore on the same individual examined in different laboratories. But much of this inaccuracy and misunderstanding could be overcome by expressing the results as grams of hæmoglobin per 100 c.c. of blood.

KERN[41] calls attention to the number of widely different hæmoglobin figures used as 100 per cent by various authors and instrument makers (viz. 13.8, 15.0, 15.6, 16.92 and 17.3 grams of hæmoglobin per 100 c.c. of blood). He emphasizes the importance of knowing the normal amount, in grams of hæmoglobin

per 100 c.c. of blood, calculated to a count of five millions red cells, since this figure forms the basis for the calculation of colour index.

The average hæmoglobin per 100 c.c. of blood lies between certain narrow limits, but when one notes the various methods used to determine the hæmoglobin content and the inherent errors of each, as determined by SCHWENTKER[80], WINTROBE[95], HADEN[27] and others, one no longer wonders at the marked discrepancies in reports on hæmoglobin determinations. The standards of all methods for determining hæmoglobin are based on the oxygen capacity, if the hæmoglobin is normal. Many colorimetric methods will give exact results ; but if the hæmoglobin is abnormal (i. e. methæmoglobin), high readings will be obtained with all methods, except with oxygen capacity method.

TABLE 5

Methods for Determination of Hæmoglobin and "Probable Error."

Author	Standardized Method	Volume of blood	"Probable Error" (per cent)	Standard, Gm. per 100 c.c. of Blood
1. Williamson	.. Spectrophotometer, Pure Hæmoglobin.	Drop	1.0	—
2. Van Slyke	.. Oxygen capacity ..	.. 1 to 2 c. c.	0.5	—
3. Van Slyke	.. Carboxy-hæmoglobin ..	.. 1 to 2 c. c.	0.5	—
4. Haldane—Palmer	.. Colorimeter, Carboxy-hæmoglobin	.. 0.1 to 0.5 c.c.	1 to 2	13.8
5. Osgood and Haskins	.. Colorimeter, Acid Hæmatin	.. 1 c.c.	1 to 2	13.8
6. Newcomer	.. Colorimeter, Plate ..	.. 0.02 c.c.	5 to 40	16.9
7. Wintrobe	.. Colorimeter, Plate ..	.. —	3 †	—
8. Sahli (Original)	.. Colorimeter ..	.. 0.02 c. c.	25 to 40	17.2
9. Sahli (Present)	.. ———	—	—	14.2
10. Sahli (Non-fade)	.. Colorimeter, Tinted Prism	.. 0.02 c. c.	5 to 7*	17.2
11. Dare (Before 1926)	.. Colorimeter ..	.. Drop	20 to 40	13.8
12. Dare (1931)	.. Colorimeter ..	.. —	—	16.0
13. Tallqvist	.. Colorimeter, Paper ..	.. Drop	20 to 40	15.8

* According to F. F. Schwentker (80).
† Newcomer Plate with 19 per cent error, correction curve reduced error to 3 per cent.

DIECKMANN and WEGNER[12], in 1934, gave the methods for the determination of hæmoglobin, as well as the percentage of the "Probable Error", as calculated by SCHWENTKER[80]. The results are shown in Table No. 5. Hæmoglobin estimation with Tallqvist Scale is still being used in India. For example, MITRA[55] in 1931 and NAPIER[59] in 1933, each reported one paper on anæmia. They were based on the estimation of hæmoglobin by Tallqvist Scale, which though the simplest, is the least reliable. One hundred per cent of the instrument is supposed to represent 15.8 grams of hæmoglobin per 100 c.c. of blood. This method of hæmoglobin estimation, though simple and rapid, is inaccurate and should be condemned and discarded ; as this instrument (Tallqvist Hæmoglobin Scale) is susceptible to errors ranging from 2 to 40 per cent[93]. Readings below sixty per cent, with Tallqvist hæmoglobin scale, according to MUSSER and WINTROBE[93], are little more than a guess. Investigations of anæmia with this instrument (for example, MITRA's[55] paper on anæmia of pregnancy), in the light of recent hæmatological researches, cannot have any scientific and research value.

The literature on normal hæmoglobin standards is difficult to summarize, because so many different methods of hæmoglobin estimations have been used, few of which are sufficiently accurate for research purposes. Relatively reliable hæmoglobin estimations have been reported[95], for 232 normal healthy women, between the ages of 17 and 30 years (vide Table No. 6) as follows :—WILLIAMSON (1916), Spectrophotometer, 49 women, averaging 15.11 Grams ; BIE and MOLLER (1922), Meisling colorimeter, checked by oxygen method, 10 women, averaging 13.50 Grams ; GRAM and NORGAARD (1923), Autenreith Konigsberger colorimeter, checked by oxygen method, 6 women, averaging 12.82 Grams ; RUD (1922-23),

Autenreith Konegsberger, checked by oxygen method, 8 women, averaging 12.28 Grams; Haden (1923), van Slyke's method, 9 women, averaging 13.50 Grams; Osgood and Haskins (1927), Osgood-Haskins method, 100 women, averaging 13.69 Grams; Wintrobe(1930),Newcomer hæmoglobino-meter, re-standardized by van Slyke's method,50 women, averaging 13.76 Grams. Thus the average of hæmoglobin estimations made on 232 women, between 17 and 30 years of age, in different parts of the world is 13.91 Grams per 100 c.c. of blood.

and Wintrobe[57] consider 13.9 Grams per 100 c.c. of blood as the average quantity of hæmoglobin in the blood of a healthy adult woman and consider the normal range to vary between 12.5 to 15 Grams. Sachs et al[78] found, in 1933, the average hæmoglobin content for women to be 12.74 Grams per 100 c.c. of whole blood, with a probable error of 0.66. The variations ranged from 9.98 to 14.70 Grams per 100 c.c. of blood. Wintrobe[96] found the average hæmoglobin value for women to be 14 Grams; ranging from 12 to 16 Grams per

Table 6

Average Hæmoglobin values, as reported by various investigators

Author	Method	Number of women	Average Hæmoglobin (Grams)
1. Williamson (92)	.. Spectrophotometer	49	15.11
2. Bie and Moller (4)	.. Meisling co'orimeter, checked by Oxygen method	10	13.30
3. Gram and Norgaard (21)	.. Autenreith Konigsberger colorimeter, checked by oxygen method	6	12.82
4. Rud (77) ..	.. Autenreith Konigsberger co'orimeter, checked by oxygen method	8	12.28
5. Haden (25) ..	.. Van Slyke's method	9	13.50
6. Osgood and Haskins (63)	.. Osgood and Haskins' method	100	13.69
7. Wintrobe (95)	.. Newcomer Hæmoglobinometer	50	13.76

Total, 232 women, averaging 13.91 Grams per 100 c. c. of Blood.

Osgood and Haskins[63] in 1927, quoted additional determinations on 133 women, whose ages were not given or in which the methods used were of doubtful accuracy. The average of these figures was 12.99 Grams. In 1932, Osgood, Haskins and Trotman[65] reported the results of their findings on 106 healthy young women. The average hæmoglobin value was 13.70 Grams per 100 c.c. of blood. Musser

100 c.c. of blood. Suwa (Jap. J. Obst. & Gyn; 13: 73, 1930) examined ten non-pregnant Japanese women (midwives and nurses) and found the average hæmoglobin content to be 84.1 per cent (Sahli).

Table No. 7 is modified from Wintrobe[96], Dieckmann and Wegner[12], Brown and Briggs[7], and Dhar who between 1933

Table 7

Mean hæmoglobin values for normal women in various geographical localities

Locality	Author and Year	Reference Number	Number of women	Hæmoglobin (Grams).
1. England ..	.. Williamson (1916)	92	49	15.53
2. Denmark ..	.. Bie and Moller (1922) ..	4	10	13.3
3. Denmark ..	.. Gram & Norgaard (1923) ..	21, 22	10	13.00
4. U. S. A. Midwest	.. Haden (1923, 1925) ..	25, 27	12	13.3
5. U. S. A. West ..	.. Osgood & Haskins (1926, 1927, 1931).	61, 63, 64	100	13.7
6. U. S. A. South ..	.. Wintrobe (1929-1930) ..	95, 97	50	13.76
7. Various parts of the world	.. Wintrobe (1930);	94	210	13.9
8. England ..	.. Price—Jones (1931) ..	74	100	13.9
9. U. S. A. East ..	.. Wintrobe (1933)	96	73	14.0
10. U. S. A. Mid-west	.. Wintrobe (1933)	96	15	14.3
11. U. S. A. West ..	.. Wintrobe (1933)	96	2	14·1
12. U. S. A. South ..	.. Wintrobe (1933)	96	11	14.1
13. U. S. A. Midwest	.. Haden (1925, 1933) ..	27, 29	30	13.4
14. U. S. A. ..	.. Brown & Briggs (1934) ..	7	13	14.01
15. India ..	.. Dhar (1934)	—	86	11.47

Total, 771 women, averaging 13.71 Grams per 100 c. c. of blood.

and 1934 published the mean hæmoglobin values for 771 women, for different geographical localities. Thus the average of hæmoglobin estimations made on 771 women, in different parts of the world is 13.71 Grams per 100 c.c. of blood.

The standard blood, according to DIECKMANN and WEGNER[13] contains 14.3 Grams of hæmoglobin per 100 c.c. of blood; while KOLMER and BOERNER[42] consider the figure to be 13.76 Grams per 100 c.c. of blood. BROWN and BRIGGS[7], in 1934, reported the results of their own findings (in 13 women) and compared them with the previously reported observations (in 180 women) of other investigators. The average hæmoglobin value, in 193 women, thus reviewed, is 13.70 Grams per 100 c.c. of blood. In 1934, DIECKMANN and WEGNER[12] gave the averages for hæmoglobin determinations, by standardized methods, in 249 normal women. It was 13.91 Grams per 100 c.c. of blood. In a recent paper, HELMER and EMERSON[34] gave the normal values of hæmoglobin, in women. The ages and the number of the subjects were not considered. Their findings are presented in Table No. 8. The average of these estimations is 13.57 Grams per 100 c.c. of blood.

TABLE 8

Normal values of Hæmoglobin in Women

Author & Year	Reference Number	Hæmoglobin (Grams)
1. Haden (1922) ..	24	13.34
2. Sacket (1925) ..	79	15.28
3. Osgood (1926) ..	62	13.70
4. Murphy et al (1931)..	56	12.68
5. Sachs et al (1933) ..	78	12.74
6. Helmer and Emerson (1934) ..	34	13.68

In eighty-six women herein reported, the average hæmoglobin value was 11.47 Grams per 100 c.c. of blood (or Sahli value 66.68). The lowest value was 9.80 Grams and the highest value 13.58 Grams (vide Table No. 22). Of all the estimations, 82.5 per cent were between the range of 10 Grams and 12.5 Grams; 4.65 per cent of the cases were less, and 12.79 per cent of the cases were more than this range (vide Figure No. I).

In the present series, the average hæmoglobin value in unmarried girls has been found to be higher than that of girls who are married or widows. Parous women have a lower hæmoglobin value than those women who have not borne children. Girls, between the ages of 16 and 18 years have a decidedly higher hæmoglobin value than those of any other age group.

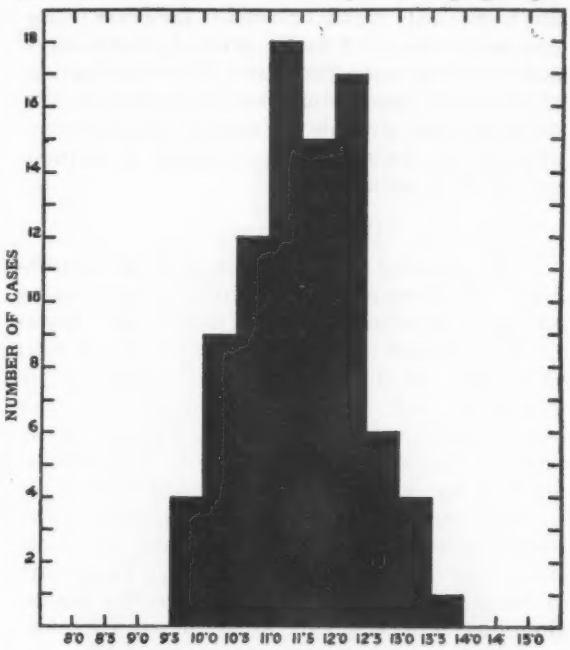

Figure 1—Histogram showing Frequency Distribution of Hæmoglobin in 86 Women, between the ages of 16 and 35 Years.

The average hæmoglobin content of Bengali women is lower than that of all reported cases (including those of the Japanese, an asiatic race) in the literature. It will be seen from the above that the hæmoglobin value is considerably lower in Bengali women than that of their sisters of the American, European and other Asiatic races. DIECKMANN and WEGNER[12] are of opinion that a subject with hæmoglobin value of less than ten grams per 100 c.c. of blood should be considered as anæmic. Thus the normal average hæmoglobin value for Bengali women, is considered in Europe and America, as bordering on anæmia. DYKE[15] is of opinion that some degree of anæmia

demanding treatment may be regarded as present when the hæmoglobin value is found to be 60 per cent or below. This is unfortunately very near the normal average figure for hæmoglobin in Bengali women.

DYKE[15] emphasizes an important point, which may otherwise seem too simple to be worthy of discussion. The fact that pallor does not necessarily mean anæmia is far from being generally recognized by the general practitioners and everyone concerned with the examination of blood has many times had to explain to the clinician that, deathly though his patient may appear, the hæmoglobin percentage is normal and there is no anæmia.

ERYTHROCYTES

The number of red cells, as well as the quantity of hæmoglobin, are variables, depending on age, sex, climate, food, exercise and Barometric pressure etc. Five millions of red cells per c.mm. of blood is usually regarded, by European and American hæmatologists, as constituting a normal count. This figure is purely arbitrary and is based on the examination of the blood of four individuals, by VIERORDT[86] and WELCKER[90], in 1852 and 1854 respectively, by methods which are now considered as inaccurate and obsolete. The count in the females is lower than that in the males. Opinions, however, vary as to the actual range which may be considered as normal in the females.

TABLE 9

Average red cell counts, as reported by various investigators

Author	Locality	Number of women	Average Red cells (millions)
1. Bierring (3)	Sweeden	3	4.24
2. Gram and Norgaard (21)	Denmark	6	4.59
3. Bie and Moller (4)	Denmark	10	4.74
4. Rud (77)	Denmark	8	4.80
5. Haden (25)	Missouri	9	4.33
6. Osgood and Haskins(63)	Oregon	100	4.80
7. Wintrobe (95)	New Orleans	50	4.93

Total, 186 women, averaging 4.78 millions per c.mm.

The red cell counts made with reasonably accurate care have been reported[95] for 186 women, between the ages of seventeen and thirty years (vide Table No. 9). BIERRING (1920) reported 3 women, averaging 4.24 millions; GRAM AND NORGAARD (1923), 6 women, averaging 4.59 millions; BIE and MOLLER (1922), 10 women, averaging 4.74 millions; RUD (1922-23), 8 women, averaging 4.80 millions; HADEN (1923), 9 women, averaging 4.33 millions; OSGOOD and HASKINS (1927), 100 women, averaging 4.80 millions; WINTROBE (1930), 50 women, averaging 4.83 millions, per c.mm. of blood. Thus the average of red cell counts made on 186 women, from 17 to 30 years of age, in different parts of the world is 4.78 millions per c.mm. of blood.

TABLE 10

Mean erythrocyte count for normal women, in various geographical localities

	Locality	Author and Year	Reference Number	Number of women	Red cells (Millions)
1.	Denmark	Bie and Moller (1922)	4	10	4.74
2.	Denmark	Gram and Norgaard (1923)	21, 22	10	4.65
3.	U. S. A. Midwest	Haden (1923)	25	12	4.26
4.	U. S. A. West	Osgood & Haskins (1926, 1927, 1931)	61,63,64	100	4.80
5.	U. S. A. South	Wintrobe (1929, 1930)	95, 97	50	4.93
6.	Various parts of the world	Wintrobe (1930)	94	210	4.78
7.	England	Price-Jones (1931)	74	100	5.01
8.	U. S. A. East	Wintrobe (1933)	96	73	4.78
9.	U. S. A. Midwest	Wintrobe (1933)	96	15	4.89
10.	U. S. A. West	Wintrobe (1933)	96	2	4.70
11.	U. S. A. South	Wintrobe (1933)	96	11	4.85
12.	U. S. A. Midwest	Haden (1925, 1933)	27, 29	30	4.38
13.	U. S. A.	Brown & Briggs (1934)	7	13	4.78
14.	Japan	Suwa (1930)	..	10	4.36
15.	India	Dhar (1934)	..	86	3.73

Total, 732 women, averaging 4.64 millions per c.mm. of blood.

Table No. 10 is modified from WINTROBE[96], DIECKMANN and WEGNER[12] and BROWN and BRIGGS[7], and DHAR who between 1933 and 1934, published the mean red cell values for 732 women, for different geographical localities. Thus the average of red cell counts made on 732 women, in different parts of the world is 4.64 millions, per c.mm. of blood.

The standard blood, according to DIECKMANN and WEGNER[13] and KOLMER and BOERNER[42] contains five millions of red blood cells per c.mm. of blood. MUSSER and WINTROBE[57] in 1932, gave the average count in normal young women, as 4.78 millions per c.mm. The values between 4.4 and 5.5 millions are considered by the authors as normal. WINTROBE[96] found the average count in women to be 4.8 millions ; the range varying from 4.2 to 5.4 millions per c.mm. In a recent paper HELMER and EMERSON[34] gave the normal values of red cells in women. The age and the number of the subjects were not considered. Their findings are presented in Table No 11. The average of all reported counts is 4.69 millions per c.mm. of blood. The average of Helmer and Emerson's figure is 5.01 millions per c.mm. of blood.

TABLE 11

Normal values of erythrocytes in women

Author and Year	Reference Number	Red cells (Millions)
1. Haden (1922) ..	.. 24	4.26
2. Sacket (1925) ..	.. 79	4.68
3. Osgood (1926)	.. 62	4.80
4. Murphy et al (1931)	.. 56	4.92
5. Sachs et al (1933)	.. 78	4.46
6. Helmer and Emerson (1934)	34	5.01

OSGOOD and HASKINS[63] quoted 184 counts made by ten different investigators on women whose age was not given. The average of these counts is 4.83 millions, per c.mm. of blood.

In 1932, OSGOOD, HASKINS and TROTMAN[65] reported the results of their findings on 106 healthy young women. The average red cell count was 4.6 millions per c.mm. of blood. DIECKMANN and WEGNER[12] in 1934, gave the average for red cell determinations, by standardized methods, in 200 normal women. The average of these counts was 4.70 millions per c.mm. of blood. BROWN and BRIGGS[7] in 1934, reported the results of their own findings, in 13 women, and compared them with the previously reported observations (in 180 women) of other investigators. The average red cell count in 193 women thus reported was 4.72 millions per c.mm. of blood.

SUWA (*Jap. J. Obst. & Gyn.* 13 : 73, 1930) found (in ten normal non-pregnant Japanese women) the average red cell count to be 4.3696 millions per c.mm. of blood.

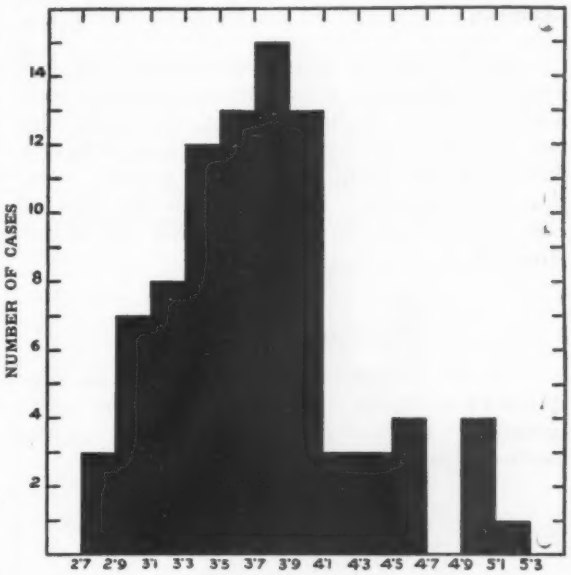

Figure 2—Histogram showing frequency of distribution of Red Cell count in 86 women, between the ages of 16 and 35 years

The average red cell count in our series of eighty-six women, between the ages of sixteen and thirty-five years was 3.73 millions per c.mm. of blood ; 79.06 per cent of the cases ranged between 2.9 and 4.1 millions red cells ; while 20.93 per cent of the cases were outside this range. Fifteen women had counts more than 4.1 million red cells per c.mm. and three women had counts less than 2.9 millions red cells per c.mm. The lowest count was 2.79 millions red cells per c.mm. and the highest count was 5.11 millions red cells per c.mm. (vide Figure No. 2).

It will be seen from the above that the red

cell count is considerably lower in the Bengali women, as compared to that of their sisters of the European, American and other Asiatic races.

The wide variations of red cell count and of the hæmoglobin in health, writes PICKARD and MARSDEN[67], make any standard quite arbitrary. The difference between men and women's blood is really a difference perhaps occasioned by the difference between their muscular activity. Sedentary persons should probably be appraised by the normal female standard.

In the present series, the average red cell count in unmarried girls (3.91 millions) has been found to be higher than that of girls who are married or widows. Parous women have a lower red cell count than those women, who have no children. Girls, between the ages of 16 and 21 years, have a higher red cell count than those who are older.

PIGMENT-CELL RATIO

In 86 women herein reported, the average pigment-cell ratio was found to be 3.07 milligrams per 100 million red cells. This is the normal figure of previous investigators.

MEAN CORPUSCULAR HÆMOGLOBIN

In 86 women herein reported, the mean corpuscular hæmoglobin was found to be 30.75 micro-micrograms. The amount of hæmoglobin in individual red blood corpurscle is, therefore, 30.75 billionths of a milligram.

HÆMOGLOBIN COEFFICIENT

Many physicians do not seem to be aware that the most commonly used methods of hæmoglobin estimation are not sufficiently accurate for colour index work. SENTY[81] and BROWN[6] agree that Dare and Tallqvist methods frequently give results varying from accurate estimations by as much as twenty per cent ; and OSGOOD[61] has found error as great as twelve per cent, in the estimations made by the new Bausch and Lomb Newcomer Hæmoglobinometer.

OSGOOD[61] and OSGOOD and HASKINS[63] emphasized the importance of the determination of an accurate standard to serve as the equivalent of 100 per cent hæmoglobin. Without an accurate standard, colour index determinations are valueless.

WINTROBE & MILLER[97] wrote in 1929: As colour index is an expression of the relation of hæmoglobin to the number of erythrocytes —the percentage of the hæmoglobin in proportion to the percentage of cells—it is important that the hæmoglobin figures taken as 100 per cent be calculated to a basis of five millions red cells, since that is the number of cells taken as 100 per cent in the calculation. Osgood has introduced the term "hæmoglobin coefficient" to represent "the number of grams of hæmoglobin per 100 c.c. of blood, calculated to a red cell count of five millions per c.mm." Before accurate colour indexes can be calculated, the normal average hæmoglobin coefficient must be determined. It is this average hæmoglobin coefficient, calculated on the basis of a large series of accurate determinations of hæmoglobin value and red cell counts, that should be used as 100 per cent by the various clinical hæmoglobinometers.

As has been pointed out by OSGOOD[61], it is necessary to convert all hæmoglobin estimations into terms of grams per 100 c.c. before calculating colour indexes, and it would be desirable to have all hæmoglobinometers standardized to read in grams per 100 c.c. of blood. Until this has been brought about each clinician should find out the number of grams of hæmoglobin equivalent to 100 per cent on his hæmoglobinometer, and then convert his results into grams per 100 c.c. of blood.

Accurate data for the calculation of the hæmoglobin coefficient are available for 303 women, between the ages of sixteen and thirty-five years (vide Table No. 12).

In 1932, OSGOOD, HASKINS & TROTMAN[65] reported the results of their findings on 106 healthy young women. The average hæmoglobin coefficient was found to be 14.34 Grams. BROWN and BRIGGS[7] compared their own

findings with those of the previous investigators. The average for the group of 193 women was found to be 14.55 Grams. It will be seen from the above that the average hæmoglobin coefficient for the eighty-six normal Bengali women, herein reported, was 15.60 Grams.

TABLE 12

Average hæmoglobin coefficient, in grams, as reported by various investigators

Author	Number of women	Average hæmoglobin coefficient (Grams)
1. Bie & Moller (4) ..	10	14.0
2. Gram & Norgaard (21) ..	6	14.0
3. Rud (77)	8	12.8
4. Haden (29)	30	15.26
5. Osgood & Haskins (63) ..	100	14.29
6. Wintrobe (95) ..	50	13.97
7. Brown & Briggs (7) ..	13	14.67
8. Dhar	86	15.60

Total 303 women, averaging 14.32 Grams.

COLOUR INDEX

The percentage of the normal load of hæmoglobin carried by each red cell is otherwise known as the colour index. This is more important than the simple number of red cells present per c.mm. of blood. The colour index is calculated by dividing the percentage of hæmoglobin by the percentage of red cells. For the purpose of this calculation, the normal hæmoglobin coefficient (for the subject's age and sex) is considered as 100 per cent, and the red cell count of five millions is considered as 100 per cent. The colour index approximates unity in normal persons. The variations of the colour index from unity, according to HADEN[26] seldom exceed five per cent, in normal adults.

TABLE 13

Average colour index, in women, as reported by various investigators

Author & locality	Number of women	Average colour index
1. Haden (Missouri) ..	30	1.10
2. Osgood & Haskins (Oregon)	100	1.00
3. Bie & Moller (Denmark) ..	10	0.99
4. Wintrobe (Louisiana) ..	50	0.98
5. Gram and Norgaard (Denmark) ..	6	0.98
6. Rud (Denmark) ..	8	0.90
7. Dhar (India)	86	0.995

Total, 290 women, averaging 0.992.

On the basis of this hæmoglobin coefficient WINTROBE[95] has recalculated the colour indexes, from the available accurate material of different investigators. They are presented in Table No. 13. In 1932, OSGOOD, HASKINS, and TROTMAN[65] reported the results of their own findings, on 106 healthy young women. The average colour index was 1.01.

The average colour index for eighty-six women, herein reported, between the ages of sixteen and thirty-five years, was 0.995. The lowest index was 0.67 and the highest 1.24. Table No. 22 contains the relevant data, from which the hæmoglobin, erythrocyte, hæmoglobin coefficient and colour indexes have been calculated. It will be seen from Figure No. 3, that 81.39 per cent of the cases had a colour index within the range of 0.80 and 1.15 ; 6.97 per cent of the cases had a lower colour index and 11.63 per cent had a higher colour index.

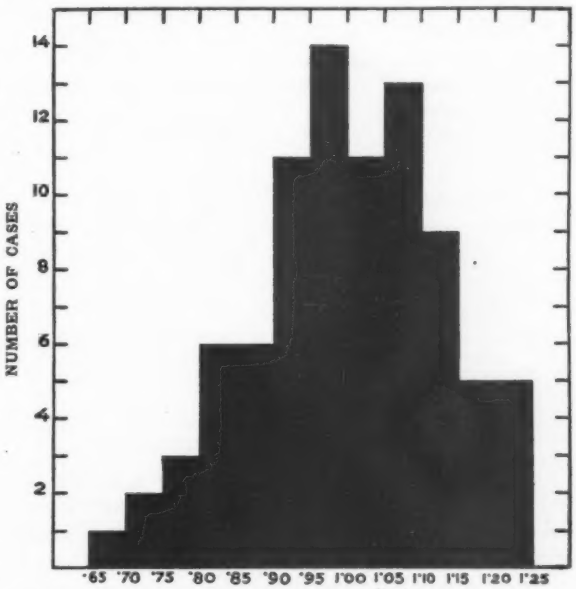

Figure 3—Histogram showing frequency of distribuiion of colour index in 86 women, between the ages of 16 and 35 years.

Calculated on the basis of hæmoglobin coefficient of 14.2, WINTROBE[95] in 1930, found that the average normal figures for 235 healthy young women, from 17 to 30 years of age, based on a number of accurate determin-

ations in different parts of the world, were as follows :—

Red cells=4.78 millions per c.mm. of blood.
Hæmoglobin=13.9 Grams per 100 c.c. of blood.
Hæmogobin Coefficient (average)=14.2 Grams.
Colour Index=1.00.

in the oxygen tension of the atmosphere or by other influences. The importance of this factor also appears from the constant difference in size between the erythrocytes in the arterial and in the venous blood, a fact on which HAMBURGER laid great stress years ago.

TABLE 14

Average values by different investigators: Comparison with previously reported observations on normal women

Author	Subjects: Number	Subjects: Locality	Red blood cells (Millions)	Hæmoglobin (Grams)	Hæmoglobin coefficient (Grams)	Colour index
1. Osgood & Haskins (63) 1926-27 ..	100	Oregon ..	4.80	13.69	14.29	1.00
2. Wintrobe (93, 97) 1929-30	50	Louisiana ..	4.93	13.76	13.97	0.98
3. Haden (29) 1922-32	30	Missouri ..	4.38	13.37	15.26	1.10
4. Bie & Moller (4) 1922	10	Denmark ..	4.74	13.30	14.00	0.99
5. Gram & Norgaard (21) 1923 ..	6	Denmark ..	4.59	12.82	14.00	0.98
6. Rud (77), 1922-23	8	Denmark ..	4.80	12.28	12.80	0.90
7. Bierring (3) 1920	3	Sweeden ..	4.24	—	—	—
8. Williamson (92) 1916	49	Illinois ..	—	15.11	—	—
9. Brown & Briggs (7) 1932-33 ..	13	U. S. A. ..	4.78	14.01	14.67	1.03
10. Dhar, (1933-34)	86	India ..	3.73	11.47	15.60	0.995
Averages	355		4.55	13.31	14.32	0.996

WINTROBE[96] reports in 1933, the mean of all reported counts for women. The averages are presented in Table No. 15.

TABLE 15

Mean of all reported counts in women

	Number of women	Averages
1. Mean red cell counts .. (millions per c.mm.)	387	4.85
2. Mean hæmoglobin value .. (grams per 100 c.c.)	433	13.9
3. Hæmoglobin-coefficient .. (grams)	—	14.3

MEAN DIAMETER OF ERYTHROCYTES

The diameter of the red cells is a factor to which of late years more and more attention has been paid, especially in the differential diagnosis and treatment of anæmias. Under normal conditions the diameter of the red cells can be changed by various influences, which have been extensively discussed among others by WINTROBE[94]. Variations of 0.5 microns occur in healthy people[1] during the day—the cells being smaller in the morning than in the evening.

The most important modifications in size are those resulting from changes in the carbonic acid tension of the blood caused by alterations

Under pathological conditions one observes an anisocytosis with, as a rule, a high microcytosis as a rather typical symptom in acholuric jaundice[18] and a still more extensive anisocytosis with preponderating megalocytosis in Addison's pernicious anæmia, tropical sprue and in pernicious anæmia of pregnancy. In judging the effect of modern liver therapy on the Addisonian pernicious anæmia, great attention is paid to the disappearance of the megalocytosis[83]. In aplastic anæmia the size of the red cells is not changed. The aforementioned changes in the diameter of erythrocytes in anæmias occur not only in adults but in children also[30].

Measurement of red cell diameters not infrequently becomes a matter of diagnostic laboratory routine. Emphasizing the importance of erythrocytometry, as an aid to diagnosis, VAUGHAN[85] wrote thus: Smears that formerly would have been classed as indicative of secondary anæmia have occasionally been found to be those of primary anæmia. Smears that most pathologists would interpret as characteristic of pernicious anæmia have been found to occur in patients that do not have primary anæmia. There appear to be a distinct group of this second class. Not infrequently

one observes blood smears with clear-cut macrocytosis, with or without anæmia, which are definitely not associated with pernicious anæmia.

The mean diameter of normal red cells is variously stated as being 7.2 to 7.9 microns. An important cause for this variation in reported mean diameters is to be found in the differences in the technique. It is important to determine the normal for the method one employs. A slight variation in the size of the cells is to be found in the normal individuals, but the range of difference, according to MUSSER and WINTROBE[57], between the largest and the smallest cells is probably not more than 3.5 microns.

TABLE 16

Average diameter of red cells, as determined by various investigators

Authors	Microns
1. Jurin (1718) ..	.. 7.75 to 12.5
2. de Senac (1749) ..	.. 7.22 to 7.69
3. Prevost & Dumas (1821)	.. 6.6
4. Young (1823) ..	.. 5 to 6
5. Lister & Hodgkin (1827)	.. 8
6. Gulliver (1846) ..	.. 7.61
7. Price-Jones (1922)	.. 6.96 to 7.49; average 7.21
8. Price-Jones (1933)	.. 4.75 to 9.50; average 7.202
Mean diameter	.. 7.202
Standard deviation	.. 0.487
Coefficient of variation	6.325 per cent.

Reviewing the history of hæmocytometry, Price-Jones[75] cited the previous, though less accurate, works of LEEUWENHOEK[45] in 1673, JURIN[39] in 1718, DE SENAC[10] in 1749, HEWSON[35] in 1770, PREVOST and DUMAS[70] in 1821, YOUNG[99] in 1823, LISTER and HODGKIN[48] in 1827, and GULLIVER[20], in 1846. He then described his own accurate methods[72,75] in detail (vide Table No. 16).

PRICE-JONES[75] found that even in normal individuals, there is a distinct diurnal variation in red cell diameters, probably dependent upon the hydrogen-ion concentration. There is a gradual increase in the size during the day, with a diminution during sleep. The variation may amount sometimes to as much as 0.6 microns. Gentle exercise has no apparent influence but violent exercise increases diameters (which correspond with an increase in volume). Nevertheless rest in bed throughout twenty-four hours periods does not abolish the diurnal variations. Cyanosis increases diameters, anywhere up to 0.4 microns. The size of cells varies with the reaction of the blood, an increased acidity causing an increase in their size and *vice versa*.

These variations in size, writes VAUGHAN[85] appear to be due to changes in hydrogen ion concentration, the swelling being associated with a decrease of alkalinity. It has been shown both in *vitro* and in *vivo* that an increase in concentration of lactic acid or of carbon dioxide causes swelling. The washing of carbon dioxide out of the blood by forced breathing was found to diminish the mean diameter by 0.5 microns. Discontinuance of forced breathing brought a rapid restoration to normal diameters. There is evidence that the blood is more alkaline during sleep than in the daytime.

TABLE 17

Red cell diameters of healthy persons

Authors & Technique	Microns
(A) *Using dry films:*	
1. Grosh & Stifel (1925)	7.4
2. Ohns & Gisevius (1925)	7.9
3. Bell, Thomas & Means (1926) ..	7.7
4. Medeares & Minot (1927)	7.55
5. Pohle (1927)	7.3
6. Silvette (1927), infants	7.4
7. Wischnewsky (1928)	7.248
8. Price-Jones (1929)	7.202
9. Dhar (1934)	7.003
(B) *Using wet methods:*	
1. Young (1823)	5.6
2. Malassez (1889)	7.7
3. Ponder & Miller (1924)	8.8
4. McCORMICK (1927)	7.3
5. Jorgensen & Warburg (1927) ..	7.6
6. Holler & Kudelka (1928)	7.6

There is no evidence to suggest that either age, sex or constitutional build has any influence on the size of the red cells. Table No. 17 gives the average values, as determined by the more accurate methods, by various investigators, of the mean diameter of red cells. It will be seen that different investigators have used different methods of technique. Some have used the wet methods, others have used the dry film technique.

With the more accurate methods of determinations of red cell diameters, the above (Table 17) figures have been obtained, by various authors. GROSH and STIFEL[23] gave the average mean diameter of red cells as 7.4 microns; OHNS and GISEVIUS[66], 7.9 microns; BELL, THOMAS and MEANS[2], 7.7 microns; MEDEARIS and MINOT[53], 7.55 microns; POHLE[68], 7.3 microns; SILVETTE[82], 7.4 microns; WISCHNEWSKY[98], 7.248 microns; PRICE-JONES[73], 7.202 microns; YOUNG[99], 5.6 microns; MALASSEZ[49], 7.7 microns; PONDER and MILLAR[69], 8.8 microns; MCCORMICK[52], 7.3 microns; JORGENSEN and WARBURG[38], 7.6 microns; HOLLER and KUDELKA [36], 7.6 microns.

In eighty-six women, herein reported, the average mean diameter of red cells was found to be 7.003 microns. The smallest mean diameter was 6.88 microns and the largest mean diameter was 7.64 microns. It will be seen from the above that the average mean diameter of the red cells in Bengali women, herein reported, is smaller than that of all reported figures in the literature of the world. This will be more clear, if the relation between the volume of a cell and its surface area is considered.

The volume of a spherical cell of diameter 1 mm. is 0.52 c. mm. and its surface area is 3.14 sq. cm., so that it has 6 units of area per unit volume. But a cell of 2 mm. diameter has a volume of 4.16 c.mm. and a surface area of 12.56 sq. cm., so that it has 3 units of area per unit of volume. Since, the volume of a sphere of radius "r" is $\frac{4}{3}\pi r^3$ and its surface is $4\pi r^2$. In other words, the small cell has a larger surface area, per unit volume than has the large one. "As substances enter and leave the cell through the surface, it follows that the functional activities of a red corpuscle, per unit weight of contained hæmoglobin, are better in the case of a small than in the case of a large corpuscle. If two persons have the same hæmoglobin and volume (hæmatocrit) content of red cells, the one, with the smaller mean diameter of red cells, is functionally better off than the one, with the larger mean diameter. It will thus be seen, that the smaller average mean diameter of red cells, in Bengali women, is a compensatory, protective mechanism, against the lower average number and hæmoglobin content of their red blood corpuscles.

In the present series, the average mean diameter of red cells in unmarried girls has been found to be smaller than that of girls who are married, or widows. The size of the red cells is also modified by the age and parity of the subjects.

The blood picture, as determined by the present investigation, is tabulated in Table No. 18.

TABLE 18

Normal average values for Bengali women

1. Hæmoglobin	=11.47	Gm. per 100 c.c. (Sahli value=66.68)
2. Erythrocytes	=3.73	millions per c.mm.
3. Hæmoglobin coefficient	=15.60	Gm. per 5 million R. B. C.
4. Colour Index	=0.995	
5. Mean diam. of R. B. C.	=7.003	microns.

INFLUENCE OF AGE

In Table 19 is shown the influence of the age of the subject on the blood-picture. It will be seen that the highest average hæmoglobin value has been obtained in girls between

TABLE 19

Showing the influence of age

Age in years	Women		Average values			
	Number	Per cent	Hæmoglobin (Grams)	Erythrocytes (Millions)	Colour Index	Mean diam. of red cells (Microns)
16—18	34	39.53	11.72	3.75	1.01	7.02
19—21	29	33.72	11.41	3.78	0.97	6.97
22—25	14	16.27	11.07	3.72	0.96	7.03
Above 25	9	10.46	11.32	3.48	1.05	7.07
Normal for Bengali women	..		11.47	3.73	0.995	7.003

the age of 16 and 18 years; the lowest value has been obtained in women, between 22 and 25 years. High red cell count has been obtained in girls between the ages of 16 and 21 years.; the highest count was in the age group of 19 and 21 years. Hæmatologically, a young woman is at her best, between the ages of 16 and 21 years.

Influence of Marital State

In Table 20 is presented the modification of the blood picture in respect to the subject being single (unmarried), married or widow.

Influence of Parity

In Table 21 is shown the influence of parity of the subject, on the blood picture. Women who have borne children have a distinct lower hæmoglobin value and red cell count than those who have not. That repeated childbirth has a deleterious influence on the health of the mother is well known. Further investigation as to the incidence of a tendency to anæmia, due to repeated childbirth is necessary, as a help to the study of the severe anæmia of pregnancy, which is rather very common in Bengal.

Table 20

Showing the modification of the blood picture, according as the subject is single, married or a widow

	Women		Average values :			
	Number	Per cent	Hæmoglobin (Grams)	Erythrocytes (Millions)	Colour Index	Mean diam. of R. B. C. (Microns)
Single	47	54.6	11.67	3.91	0.98	6.98
Married	15	17.5	11.14	3.73	0.96	7.04
Widow	24	27.9	11.28	3.44	1.04	7.05
Normal for Bengali women			11.47	3.73	0.995	7.003

Table 21

Showing the influence of parity

Parity	Women		Average values			
	Number	Per cent	Hæmoglobin (Grams)	Erythrocytes (Millions)	Color Index	Mean diam. of R. B. C. (Microns)
Parous	19	22.1	11.09	3.56	1.01	6.99
Non-parous	67	77.9	11.58	3.77	0.99	7.005
Normal for Benga'i women			11.47	3.73	0.995	7.003

It will be seen that both the average hæmoglobin value and red cell count in girls who are not married ("single") are higher than those girls who are either married or widows. This finding has an important bearing on the social custom which is prevalent in Bengal, a custom which restricts the "out-of-door life' of married women and widows to the minimum. This point requires further investigation.

Summary and Conclusions

1. The normal blood-picture in eighty-six healthy young Indian (Bengali) women, between the ages of sixteen and thirty-five years, is presented, with a view to furnish accurate data from which to calculate the normal physiological base line of the blood-picture in them.

The knowledge of such a standard base line is absolutely essential to the study of different forms of anæmias or any pathological condition in these women. The more recent and important literature on the subject has been very briefly summarised.

2 The average values for hæmoglobin, red blood cells and mean diameter of red cells are far too low in these women, as compared to the average figures of all reported cases (in European, American and Japanese literature), for the same age-group. In the race of life, our women are handicapped, so far as the blood-picture is concerned.

3. The influence of various factors, such as, age, marital state and parity have been incidentally investigated and discussed. The possible deleterious influence of conservative social customs and repeated pregnancies, on the health and the blood-picture in women, has been emphasized. Further investigation in this line has been advocated.

4. This investigation, of normal blood determination in Indian women is the first of its kind in this country. Further study, in a larger series of individuals, of different age and sex groups in Indians, has been emphasized.

5. The average hæmoglobin estimation is 11.47 Grams per 100 c.c. of blood (or Sahli value 66.68); the range being 9.80 Grams (lowest) to 13.58 Grams (highest) per 100 c.c. of blood. The pigment-cell ratio is 3.07 and the mean corpuscular hæmoglobin is 30.75 micro-micrograms.

6. The average red blood cell count is 3.73 millions per c.mm. of blood; the range being 2.79 millions (lowest) to 5.11 millions (highest) per c.mm. of blood.

7. The hæmoglobin coefficient is 15.60 Grams. This is rather high.

8. The average colour index is 0.995; the range being 0.67 (lowest) to 1.24 (highest).

9. The average mean diameter of red blood cells is 7.003 microns; the range being 6.88 microns (smallest) to 7.64 microns (largest).

TABLE 22

Giving relevant data on which this paper is based

Serial No	Name	Age	Single Married Widow	Parity	Mean Diameter of Red cells (Microns)	Hæmoglobin (Grams per 100 c.c.	Erythrocytes: (millions per c.mm.)	Hæmoglobin coefficient (Grams)	Colour Index	Serial No
1	A. R.	16	S	0	7.02	10.83	3.22	16.81	1.07	1
2	N. R.	17	S	0	7.32	11.52	3.45	16.69	1.06	2
3	N. M.	17	M	0	7.02	12.04	3.52	17.10	1.09	3
4	A. B.	18	S	0	7.02	13.24	4.09	16.18	1.03	4
5	P. G.	18	M	0	7.02	12.21	4.22	14.46	0.92	5
6	H. B.	18	S	0	6.88	12.29	3.45	17.81	1.14	6
7	R. D.	18	S	0	6.88	11.43	3.18	17.97	1.15	7
8	U. G.	19	S	0	6.88	11.18	3.55	15.46	0.99	8
9	S. M.	24	S	0	6.88	11.78	4.59	12.83	0.82	9
10	K. G.	18	S	0	7.02	12.47	4.09	15.24	0.97	10
11	A. P.	18	S	0	6.88	12.55	4.01	15.64	1.00	11
12	B. R.	18	S	0	6.88	12.55	3.74	16.77	1.07	12
13	P. S. G.	20	S	0	6.88	12.12	4.44	13.64	0.87	13
14	S. C.	18	S	0	6.88	11.35	3.42	16.59	1.06	14
15	S. B.	18	S	0	6.88	10.32	3.41	15.13	0.96	15
16	N. D.	18	S	0	6.88	11.69	3.88	15.06	0.96	16
17	R. M.	17	S	0	7.02	13.07	3.73	17.52	1.12	17
18	N. R.	18	S	0	6.88	10.32	3.39	15.22	0.97	18
19	B. D. G.	18	S	0	7.17	12.38	3.71	16.68	1.06	19
20	H. G.	18	S	0	7.02	12.04	4.54	13.25	0.84	20
21	R. G.	19	S	0	6.88	13.58	4.62	14.69	0.94	21
22	F. G.	17	S	0	7.64	11.35	3.93	14.44	0.92	22
23	U. G.	21	S	0	6.88	11.69	3.95	14.79	0.94	23
24	S. R.	20	S	0	6.88	11.18	4.07	13.70	0.87	24
25	B. G.	18	S	0	6.88	10.92	3.44	15.87	1.01	25
26	S. D. G.	19	S	0	6.88	13.41	4.59	14.61	0.93	26
27	N. M.	20	S	0	7.02	10.49	3.98	13.17	0.84	27

Serial No	Name	Age	Single, Married Widow	Parity	Mean diameter of Red cells (Microns)	Hæmoglobin : (Grams per 100 c.c.)	Erythrocytes : (millions per c.mm.)	Hæmoglobin coefficient (Grams)	Colour Index	Serial No
28	G. R.	19	S	0	6.88	10.40	3.86	13.47	0.86	28
29	L. K.	19	S	0	6.88	11.69	3.07	19.07	1.22	29
30	S. S.	19	S	0	6.88	10.49	3.93	13.34	0.85	30
31	J. R.	18	S	0	7.02	12.47	4.09	15.24	0.97	31
32	B. D. G.	18	S	0	7.17	11.61	5.09	11.40	0.73	32
33	M. R.	19	S	0	6.88	12.29	3.79	16.21	1.03	33
34	A. D.	18	S	0	6.88	11.09	4.99	11.11	0.71	34
35	K. R.	18	M	0	7.02	12.29	5.03	12.21	0.78	35
36	R. D.	19	S	0	6.88	12.04	3.47	17.34	1.11	36
37	S. B.	18	S	0	7.02	12.81	3.75	17.08	1.09	37
38	C. S.	21	S	0	7.02	10.83	5.11	10.59	0.67	38
39	C. M.	19	S	0	6.88	10.32	3.95	13.06	0.83	39
40	S. G.	22	M	1	6.88	10.14	2.94	17.24	1.10	40
41	A. G.	16	S	0	7.02	10.32	3.49	14.78	0.94	41
42	P. D.	20	W	0	7.17	11.43	3.86	14.80	0.94	42
43	A. S.	20	M	1	7.17	9.97	4.11	12.22	0.78	43
44	P. A.	22	M	3	7.32	9.80	4.04	12.12	0.77	44
45	M. H.	18	S	0	7.48	10.14	3.13	16.19	1.03	45
46	K. S.	19	W	0	7.02	9.97	3.31	15.06	0.96	46
47	K. S.	19	S	0	7.32	11.61	3.73	15.56	0.99	47
48	P. B.	21	W	0	6.88	11.86	3.54	16.75	1.07	48
49	K. D.	19	M	1	6.88	10.57	3.63	14.55	0.93	49
50	A. R.	19	W	0	6.88	11.18	3.87	14.44	0.92	50
51	M. D.	18	W	0	7.02	11.09	3.63	15.27	0.97	51
52	S. S. G.	18	S	0	7.17	10.75	2.93	18.34	1.17	52
53	T. B.	17	W	1	7.02	10.83	2.79	19.40	1.24	53
54	R. G.	18	S	0	7.17	12.90	3.55	18.16	1.16	54
55	P. G.	17	S	0	6.88	12.98	4.18	15.52	0.99	55
56	S. M.	21	S	0	6.88	12.12	3.91	15.49	0.99	56
57	P. R.	22	S	0	6.88	11.35	4.35	13.04	0.83	57
58	R. P.	21	W	0	7.48	12.47	3.51	17.76	1.13	58
59	B. M.	22	M	1	7.17	10.57	3.07	17.21	1.10	59
60	M. S.	23	M	3	7.02	11.78	3.15	18.69	1.19	60
61	B. C.	19	S	0	6.88	11.00	2.88	19.09	1.22	61
62	K. D.	20	M	1	6.88	10.66	3.05	17.47	1.11	62
63	J. R.	20	W	0	6.88	12.04	3.11	19.35	1.24	63
64	N. B.	17	M	0	6.88	11.52	3.49	16.50	1.05	64
65	S. B.	22	M	0	7.02	11.26	3.60	15.63	1.00	65
66	A. B.	23	W	1	6.88	11.18	3.94	14.18	0.90	66
67	S. S.	22	W	0	6.88	11.69	3.63	16.10	1.03	67
68	S. D.	22	W	0	7.17	10.14	3.00	16.90	1.08	68
69	N. S. G.	17	S	0	7.02	11.86	3.66	16.20	1.03	69
70	R. R.	19	S	0	6.88	12.04	3.64	16.53	1.05	70
71	R. S.	21	W	0	7.48	11.00	3.74	14.70	0.94	71
72	N. R.	18	W	0	7.02	11.52	3.33	17.29	1.10	72
73	S. D.	25	W	2	6.88	9.80	3.19	15.36	0.98	73
74	H. R.	24	M	2	7.32	13.24	4.92	13.45	0.86	74
75	A. C.	25	M	0	7.17	10.32	3.84	13.43	0.86	75
76	K. G.	35	W	4	7.48	10.32	2.87	17.97	1.15	76
77	S. R.	32	W	2	7.02	11.52	3.05	18.88	1.21	77
78	K. M.	24	W	1	7.02	12.04	3.87	15.55	0.99	78
79	P. M.	21	W	1	6.88	11.35	3.50	16.21	1.03	79
80	H. M.	35	W	2	7.48	12.55	3.79	16.55	1.06	80
81	G. G.	28	W	0	7.32	11.35	3.17	17.90	1.14	81
82	P. M.	28	W	1	6.88	11.52	4.48	12.85	0.82	82
83	L. B.	35	W	1	6.88	12.12	3.76	16.11	1.03	83
84	H. G.	27	M	0	6.88	10.83	3.45	15.69	1.00	84
85	R. S.	27	W	0	6.88	11.00	3.21	17.13	1.09	85
86	S. B.	29	W	2	6.88	10.75	3.61	14.88	0.95	86
Average		20.58	—	—	7.003	11.47	3.73	15.60	0.995	

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ANÆMIA IN NEPHRITIS

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The characteristic pallor in cases of nephritis is a familiar phenomenon and a majority of the clinicians as well as the pathologists agree that this pallor in cases of nephritis is due to a true anaemia of defective blood formation with a low colour index and not due to mere spasm of the cutaneous blood vessels. Some of them even go so far as to say that the degree of anaemia is more or less proportional to the extent of kidney tissue damaged. Some hold that it is commensurate with the non-protein nitrogen content of the blood. E. P. SCARLETT has found a similar parallelism between blood non-protein nitrogen and marked anaemia, thus emphasising the importance of anaemia in cases of nephritis as a grave prognostic sign.

B. ASHE of New York suggests that Hb % and R. B. C. count are both decreased in pure cases of renal insufficiency but in cardiac or cardio-renal cases the R. B. C. count may be normal; only Hb % is diminished; whereas in cases of hypertension both the Hb % and R. B. C. count are either normal or above it.

I examined the blood urea and Hb % of almost all cases of nephritis admitted to the wards of K. G. Hospital during the months of Aug., Sept., and Oct. 1933. I also carried out the standard urea clearance test (Van Slyke) and urea concentration factor in these cases to assess roughly the amount of renal tissue damaged (*see table No* 1). Routine examination of stools (macroscopic & microscopic) was also carried out in all cases in order to obviate the possibility of ankylostoma doudenale in their stools.

After plotting the Hb % and blood urea readings on a graph chart (*See chart No.* I) one found a definite relation between the two and the only two cases which did not show this relation had an additional factor in the presence of ankylostomiasis which has particularly brought down the Hb %. This chart bears out clearly that as the blood urea rises the Hb % falls and the greater to rise of the former the more the fall of the latter. Of course one has to be a little cautious when one makes such a statement because there are a great many extra-renal conditions which may account for the rise in blood urea and where there is no change in Hb %. So this relation between Hb % and the blood urea content only stands true in cases of Bright's disease. Thus it becomes apparent that in pure cases of glomerulo-tubular nephritis the Hb % has a definite significance.

This fact is still more clearly borne out when one plots the urea clearance test figures and Hb % on a chart (*See chart No. II*). It

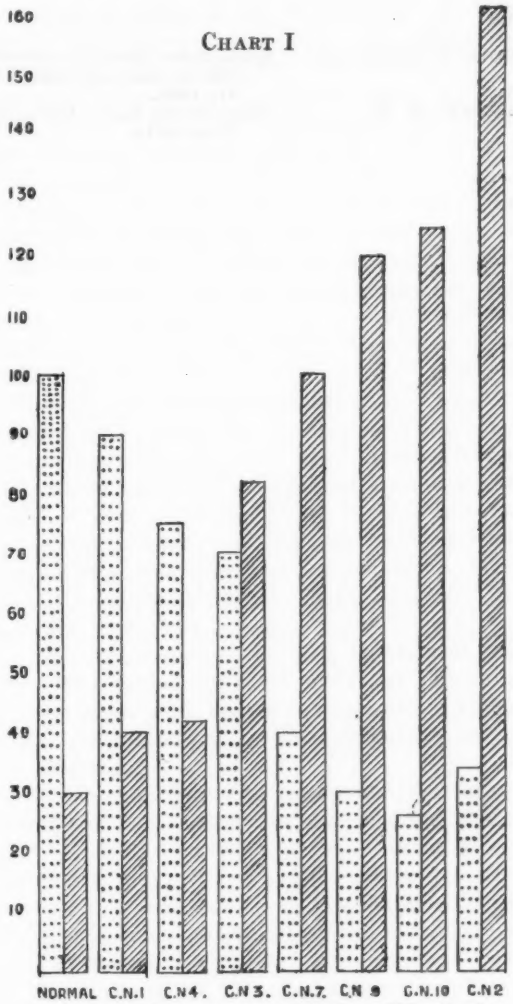
TABLE No. 1.

Case No.	Sex.	Age.	Hb %	Blood urea per 100 c.c. of blood	U. C. Test	U. C. Factor
1.	M	44	90%	40 mgs.	20	35
2.	M	35	34%	162 „	2.8	4.4
2.	M	35	34%	162 „	2.8	4.4
3.	M	30	70%	82 „	4.1	7.9
4.	F	25	75%	42 „	22.8	21.4
5.	M	30	28%	70 „	8.9	11.2
6.	M	50	28%	80 „	4.9	15
7.	M	40	40%	100 „	9	15
8.	F	40	92%	25 „	—	—
9.	F	40	30%	120 „	3	6
10.	M	30	26%	125 „	3.6	4.9

*Ova of ankylostoma duodenale in stool.
U. C. Test (Standard clearance test).
U. C. Factor (Urea concentration factor).

shows at least roughly that as the renal efficiency as measured by the urea clearance test figures decreases the Hb % also falls. Thus the Hb % may be taken as a rough measure of the extent of insufficiency of the kidneys in cases of Bright's disease.

CHART I

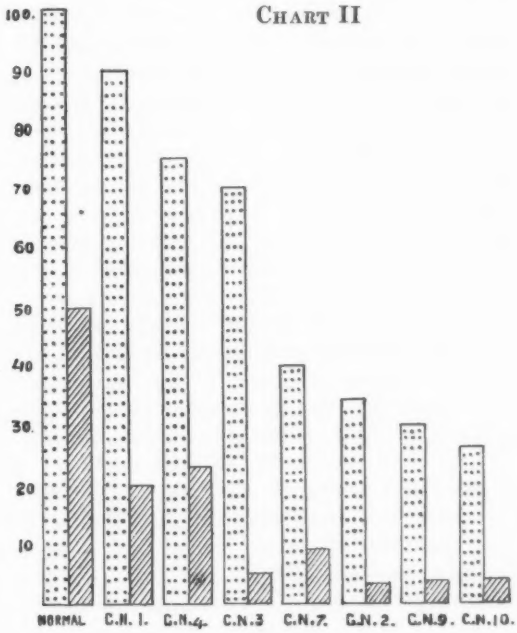


Hb % and blood urea are plotted on this chart.
Normal Hb %—100 % and normal blood urea about 30 mg.
Case number (C. N.) as noted in Table No. I.
Chart shows—that as the Hb % comes down the blood urea rises.
Hb %
Blood urea.
Dots = Hb ; Lines = Blood urea.

G. E. BROWN and G. M. ROTH examined a group of 132 cases. Those with no anaemia showed 18 % mortality in 2½ years ; those with 60 to 85 % Hb showed 46 % mortality and those with less than 60 % Hb showed 85 % mortality in 2½ years. Thus Hb % has also a definite prognostic value in cases of nephritis.

Anæmia, therefore, is a very important manifestation of nephritis and it has been suggested that the same factor which is responsible for the damage to the renal tissue probably also injures the bone-marrow, thus hindering the normal process of haemopoesis. The anaemia is thus due to diminished blood formation, the signs of increased blood destruction being lacking.

CHART II



Hb % and the urea clearance test figures have been plotted together in the Chart.
Normal Hb %—100 % and average standard—
Urea clearance test about 50.
C. N.—Case number (See Table No. I).
Hb %
Urea clearance Test.
Dots=Hb ; Lines=Blood urea.

CONCLUSION & SUMMARY

Anaemia in nephritis is due to diminished blood formation and has a low colour index. The Hb % is diminished in the inverse proportion to the blood urea content (*See chart No. I*) and direct proportion to the urea clearance

test (*See chart No. II*). It has a definite prognostic significance in pure cases of glomerulo-tubular nephritis—the lower the Hb %, the worse being the prognosis.

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PRELIMINARY NOTES ON SURGICAL TREATMENT OF ASCITES BY FASCIAL (INTERNAL) DRAINAGE

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Ascites seems to be an unsolved problem due to etiological uncertainties and diagnostic anomalies. The ascitic patient generally comes for surgical treatment as forlorn cases of "Surgical delay." We find them broken down from the damaging influences of hepatic cirrhosis and concomitant systemic diseases. Post-operative tolerance is therefore an important consideration while deciding upon the character of surgical interference ; indeed the subject bristles with difficulties with the hypothetical conceptions of its causation. If we do not know the cause, we know the result and to some extent the sequential chain of events which lead to it. If the surgical treatment of the cause or causes are beyond surgical aid, we can at least make an attempt at beginning at the tail end, that is, the ascites and devise rational means of its relief or cure with the hope, even if not too optimistic a hope, that nature might retrace and change the gear to the reverse. With or without preconceived ideas, some of the best and ingenious surgical brains have in the past devised means of running the ascitic pool dry. The varied types of operation, ingenious in their conception and technique are in themselves an indication of the desperateness of the situation.

It is not proposed to enumerate the various operations here. External and internal drainage, formation of new channels of anastomosis, capillary or venous, veno-peritoneal and vesico-peritoneal anastomoses, epiplorrhaphy, hepatorrhaphy, splenectomy and splenorrhaphy are some of them.

The object of this communication is to describe an operation which I have devised for the relief of ascites with much coveted but diffident hpoes for its cure. It struck me that I should begin at the end and at the very tail end of the end and that is using the lymph vessels and lymph channels for the transference of the ascitic fluid from its peritoneal pond into extraperitoneal tissues for its absorption and utilisation. In order to ensure the efficiency and permanence of such drainage, I thought that aponeurotic and fascial membranes endowed with the power to live for indefinite periods, their vitality depending on efficient lymph supply. Experimental surgery has proved this beyond doubt ; fascial membranes removed months after their transplantation show that their cellular structures were still intact, there being no change in their fibres and cells. The physiological integrity of these membranes is retained.

I had disappointing experience in several cases of internal drainage by lymphangioplasty (with silk threads) for ascites, elephantiasis and similar conditions ; not only were the post-operative results very indifferent but in several cases in which I had occasions to operate again, the gross naked eye appearance and microscopic structure of sections of tissues removed from these were not in accordance of our expectations. This led me try living tissues like fascial membranes such as the fascia lata of the thigh for purposes of internal drainage and I was encouraged by the study of the interesting experimental work of several workers, notably that of GALLIE and LE MESURIER of Toronto.

The omentum is a fenestrated membrane over which the mesothelium stretches. It consists of two layers but at its free end, near the fringe, the two layers coalesce and get fused into one and is thus a general connective tissue stroma layer covered on either side with mesothelium. If an intimate connection of the lymph spaces of the omentum with interfascicular lymph spaces of a fascia such as strips of fascia lata be effected and if these strips are led through the peritoneum to similar tissues, namely, the aponeurotic sheaths of the abdominal parietes,the prospects of drainage of the ascitic fluid *via* the essentials of lymph channels of the omentum, peritoneum, and the fascial strips to similar channels in the parietal aponeuroses and finally through the lymph capillaries and blood capillaries on to the systemic venous channels would not be remote.

Based on this rational hypothesis, I planned an operation which I described at a meeting of the Clinical Section of the Indian Medical Association. I also exhibited one of the patients, this being the first of a series of consecutive cases operated by the method described below.

Operation

A strip of fascia lata measuring about 6″ long and 3″ wide is dissected out from the antero-lateral aspect of the thigh through a longitudinal incision in it. This piece is anchored by four pieces of catgut and stripped off into four narrower pieces so that each strip though of the original length is about ¾″ wide. These strips are cleared of fat and areolar tissue and kept in warm normal saline solution. A right paramedian laparotomy incision is made with the umbilical line as its mid-point. The ascitic fluid is allowed to escape and the abdomen inspected and explored for abnormal conditions; the liver and spleen are palpated to ascertain variations in size, consistence and surface conditions for evidences of cirrhosis.

Through the incision the free lateral and distal margins of the omentum are delivered. To the free margin and to the extent of about two inches from it, the four fascial strips are planted at equal intervals by catgut single-point sutures. These are led out of the laparotomy wound and while doing so, secured by its edges to and about the edges of the peritoneal incision. These strips are then insinuated between the aponeurotic layers of the external and internal oblique muscles taking care that throughout their length the strips are loose and without least tension. The distal ends of the strips are secured to the aponeuroses by single point sutures of catgut. two c.c. of sterile adrenalin chloride solution (1 in 1000) is let into the peritoneal cavity. The peritoneum is closed by interrupted sutures the points of emergence of the fascial strips being secured by additional sutures if necessary thus guarding against prolapse. The parietes is closed by judicious overlapping of the aponeuroses and muscles of the parts lateral and medial to the incision. The skin incision is then closed.

The post-operative events of clinical interest are an irregularly elongated zone of oedema and induration corresponding to the site of the distal trasplants of the fascial strips; a diffuse oedematous condition of the right ilio-inguinal region often extending to the right femoral triangle and anterior and lateral aspects of the thigh; engorgement of the superficial abdominal veins on the right side and a progressively increasing renal output as evidenced by the quantity and character of urine.

The abdomen reduces in size, perhaps in some cases after one or two initial post-operative paracentesis and maintains its circumferential diminutions at least for the period under observation. There is a definite improvement in the general condition of the patient, improved digestive and nutritional conditions as evidenced by increase in body weight and physical strength and activity. It looks as if the patient who was running down a steep downhill into a marasmic condition doomed to a fatal end, makes a steady progress towards normal health and vigour. The dysfunctioning liver, slowly and steadily, tries to return to its normal duties and the kidneys in like manner wake up to their secretory and excretory obligations.

The cases were under my care in the Carmichael Medical College Surgical Hospitals and the case records, graphic charts and photographs are the work of my House Surgeon Dr. Romen Bose and one of my pupils Mr. Pratima Dutt.

These are but the preliminary notes. It is not the object of this communication to deal with the merits of other surgical methods of treatment. I am indebted to the Medical Units of this institution for the supply of cases and preliminary medical treatment and advice particularly to Dr. B. C. Roy, Dr. H. Ganguly and Dr. B. Shaha. Dr. Charu Bose, Professor of Pathology and Dr. H. Mukherji, our Biochemist have been of great assistance in making necessary investigations. Dr. Bose has made some interesting sections of tissues removed from the transplanted parietal areas. I gratefully acknowledge the extreme courtesy and cooperation of these colleagues and Dr. P. C. Roy, the Resident Surgeon and the House-staff of the Medical and Surgical units.

The operation is short and simple and the post-operative shock even in these cases of ascites is negligible though it must be admitted that shock is minimised by pre-opeartive preparations, nitrous oxide and gas anaesthesia and post-operative care of patients in my wards.

No pretentions are made for a cure of ascites ; it would be surgical impudence to do so on such short statistics of cases with short post-operative observation. To have given relief to the sufferings of the ascities even for a few months and extended their otherwise short span of lives are in themselves a source of gratification and a justification for the surgical measures adopted. These are consecutive, non-selected cases and as will be seen most of them were almost in an inoperable condition. Perhaps others interested in this branch of surgery may feel tempted to adopt this method of treatment and if they do it with success it would be a source of further gratification to me.

Case Reports

Case I

Pt. K. D., Hindu, female 34. of Burdwan admitted on 18th April 1934.

During last 4 months, the abdomen was enlarging with fluid and the quantity of urine diminishing steadily —difficulty in breathing. She was admitted in the medical side where paracentesis abdominis was done. Feeling better she left the hospital but as the abdomen filled up again and the dyspnoea increased she took admission in the surgical side. She was much emaciated with hurried and distressed respiration. Her abdomen was enormously distended and she could only rest propped up in bed.

On physical examination, the upper margin of the liver was in the 5th space at the mid-clavicular line, lower margin could not be palpated. Spleen —palpable. Scattered rales in both lungs. Pulse—small and very soft. She was intensely anæmic.

Blood Examination Report

on 19.4.34.		on 15.5.34
H. B.	40%	45%
R. B. C.	2.5 mill	3 mill
W. B. C.	12,500	7,450
Poly morphs	75%	65%
Small mono	20%	20%
Large mono	nil	15%
Eosin	5%	nil

Biochemical Examination of Blood

on 23.4.34.		8.5.34
N. P. N.	24 mg%	19 mg%
Urea N.	12 mg%	7 mg.%
Cholesterol	130 mg.%	180 mg.%

Blood Pressure	
Systolic	95 mm of Hg.
Diastolic	70 „ „
Coagulation time	4½ min.
Aldehyde & Chopra's Test	negative
Malaria Parasite	not found
W. R. & Kahn	negative

Properative paracentesis abdominis was done on 22.4.34. with withdrawal of 8 pints of fluid.

Ascitic fluid

Straw-yellow colour with only a few mononuclear cells, sterile on culture.

Albumin 0.42%
Globulin 0.18%

Operation on 25.4.34.

On exploration—Liver diminished in size and ard ; margin sharp. Spleen enlarged and hard.

Post-operative notes.

On 16th June, 2 pints of fluid withdrawn by paracentesis.

Progress.

26.4.34. P/R — 90/20
4.5.34. Stitches removed P.U.
8.5.34. Oedematous zone on the right side of suture line
27.5.34. Veins prominent on the right side of abdominal wall.

Measurement (in inches)	18/4 28/6	22/4 7/7	10/5 13/7	18/5 12/7	27/5 7/8	10/6 25/8	16/6
Subcostal	33 27½	26 28½	29½ 27½	27½ 27	27 27	29 27	26
Umbilical	32 27	26 28	29½ 27½	27 27½	27½ 27	28 27	27
Urine (in ounces)	9	14	25	16	25	70	60

15.8.34. — a piece of tissue was removed from transplanted fascial aponeurotic area for histological study.

Case II

Pt. P. B., Hindu male, 60 years, of Hugli, admitted on 12.8.34.

About 3 months back the pt. had a pain in the right hypochondriac region and melena after lifting a heavy weight. About a week later he had severe hematemesis followed by melena and gradual swelling of the abdomen. Had malaria 7 years ago ; is an alcohol addict—gives history of syphilis 25 years ago.

An old man of reduced health with abdomen uniformly distended with all the classical signs of ascites present. Upper margin of the liver was in the 5th space at the midclavicular line ; lower margin could not be palpated. Spleen—palpable. Few scattered rales on both bases of the lungs.

Blood Examination Report

on 13.8.34.		
	H. B.	55%
	R. B. C.	3 mill
	W. B. C.	4,200
	Polymorphs	66%
	Small mono.	30%
	Large mono.	4%
	Eosin	nil.
Coagulation time		3 min.
Aldehyde & Chopra's test		negative
Malaria Parasite		not found

Blood Pressure Systolic 95 mm of Hg.
Diastolic 60 mm of Hg.

W. R. & Kahn 18.8.34 Strongly positive
2.11.34 negative.

Biochemical Examination of Blood

	on 15.8.34	on 2.11.34.
N. P. N.	47 mg. per 100 c.c. of blood	30 mg. per 100 c.c. of blood.
Urea N.	17 mg...	10.5 mg...
Cholesterol	160 mg...	
Blood Sugar	.07%	

Laevulose Tolerance Test

	on 18.8.34.	on 2.11.34.
Fasting	.065%	.074%
1st Hour	.074%	.091%
2nd Hour	.077%	.094%

Ascitic Fluid

Straw yellow in colour with a few mononuclears only; no growth on culture.

Albumin 0.5%
Globulin 0.21%

Operation on 22.8.34.

On exploration liver diminished in size hard; margin sharp. Spleen—enlarged.

Post operative notes

Though W. R. was strongly positive, antisyphilitic treatment could hardly be given till some days after operation.

Progress

22.8.34 P/R—95/25

24.8.34. Ilio-inguinal region, penis and scrotum-oedematous.

28.8.34. Subsidence of the oedema.

6.9.34. Stitches removed P. U. except at the lower angle. An oedematous zone on the right side of the suture line.

29.9.34. Pt. went away against our advice, but presented himself on 2.11.34. i.e., about 2½ months after the operation when further notes were taken.

Measurement (in inches)	16/8	22/8	6/9	13/9	20/9	28/9	2/11
Subcostal	33	35	35	33	32½	31	29½
Umbilical	32	33½	33½	32½	31	29	29
Urine (in ounces)		24	45	38	45	71	60

Case III

Pt. T., Hindu, female, 40 years, of Calcutta was admitted in medical wards on 28.8.34, transferred to the surgical ward on 13.9.34.

The patient noticed general swelling of the abdomen 1½ years ago. Repeated paracenteses abdominis were done. She had the history of occasional drinking of Toddy. Mother of 6 children, one premature labour.

General health was bad. Abdomen enormously distended with all the classical signs of ascites present. Upper marign of the liver was in the 4th space at the midclavicular line; lower margin palpable ½" below the costal arch. Spleen was not palpable.

Blood Examination Report on 29.8.34.

H.B.	60 %
R. B. C.	3.9 millions
W. B. C.	5,900
Polymorphs.	76%
Small mono.	9%
Large mono.	1%
Eosin	14%

Coagulation time 3½ min.
Aldehyde & Chopra's Test negative
Malaria Parasite not found
Blood Pressure Systolic 95 mm of Hg.
Diastolic 70 mm of Hg.
W. R. & Kahn Strongy positive.
Biochemical examination of blood.

29.8.34·

N. P. N.	22.4 mg.	
Urea N.	7 mg.	per 100 c.c. of blood
Creatinine	1.3 mg.	
Chlorides	521 mg.	
Cholesterol	160 mg.	
Albumin	4.3%	
Globulin	3.8%	
Fibrinogen	0.22%	

Ascitic Fluid

Straw colour, cellular elements scanty, only a few mononuclears. Culture—sterile.

Albumin 0.61%
Globulin 0.15%

Preoperative paracentesis on 21.834 20 pints of fluid
on 31.8.34 6 pints of fluid
on 18.9.34 7 „ „
on 28.9.34 8 „ „

Operation on 29.9.34

On exploration a mass irregular in outline of the size of cricket ball, evidently malignant in appearance and feel was seen occupying the under surface of liver involving the gall-bladder and intimately adherent to it. On abdominal palpation before operation this mass might have been mistaken for enlarged liver.

Post-operative notes.

Anti-syphilitic treatment
on 27.10.34 paracentesis abdominis with withdrawal of 5 pints of fluid.

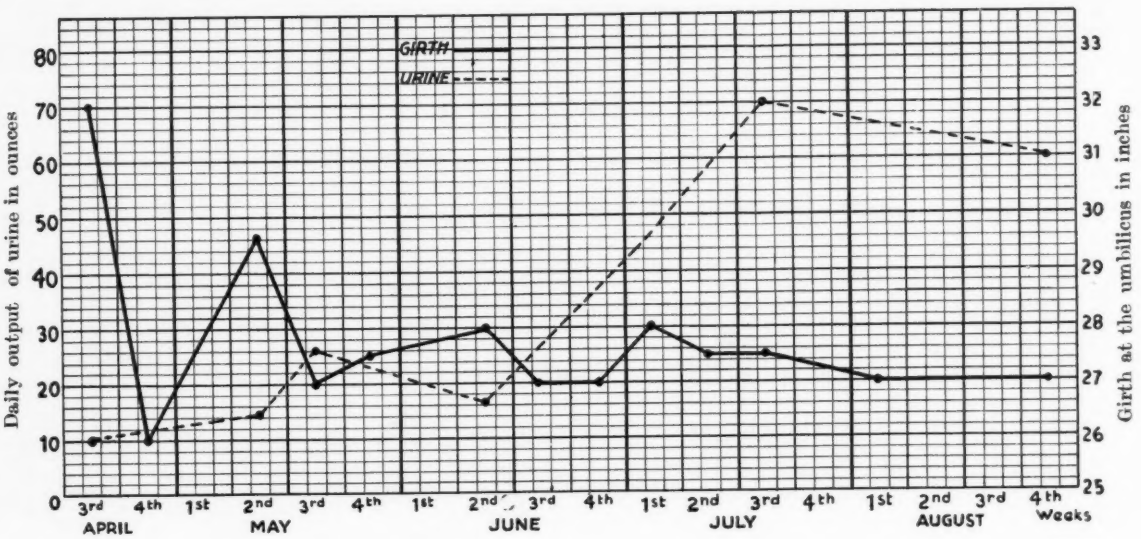
Progress

29.9.34 P/R 130/34
1.10.34 Oedema of ilio-inguinal region and feet
P/R 115/30
3.10.34 Subsidence of oedema.
P/R 110/30
9.10.34 Stitches removed; small stitch abscess which healed in 3 days. An oedematous zone on the right side of suture line.
P/R 100/26
20.10.34 Prominence of veins on the right side of abdominal wall.

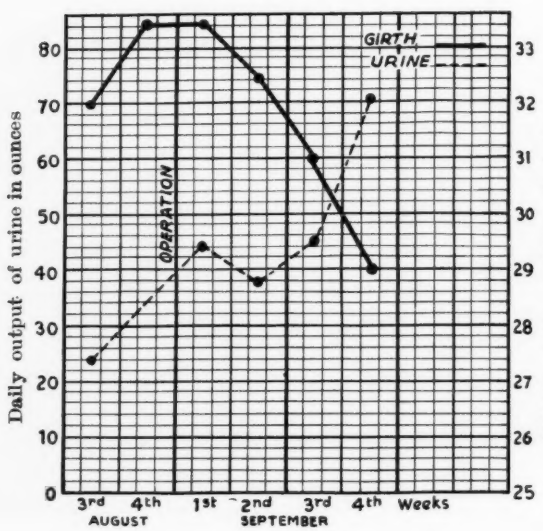
Measurement (in inches)	15/9	28/9	9/10	15/10	25/10	4/11
Subcostal	30½	30½	28	28½	29	29
Umbilical	33	33½	28	28½	30½	31½
Urine (in ounces)	11	20	24	25	29	32

N. B. In this case there were several paracentesis done before operation with no substantial diminution in girth but after the operation, no paracentesis was necessary till 27.10.34 when only 5 pints of fluid were withdrawn.

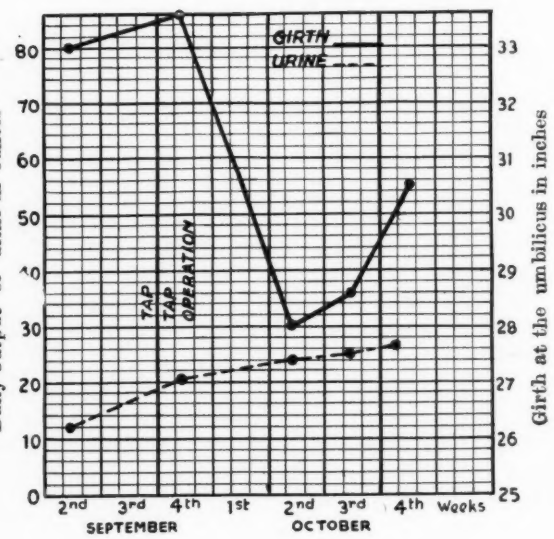
CASE I



CASE II



CASE III



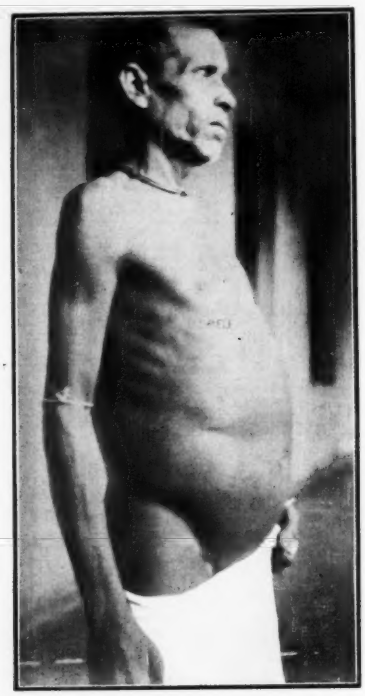
CASE I

Before operation

After operation
Anterior view

After operation ; lateral view
(The greatly dilated veins are seen)

CASE II



Before operation

After operation.

Case IV

Pt. H. B., mohamedan female, 40 years, of Calcutta was admitted on medical side on 13.10.34 and transferred to the surgical side on 20.10.34.

Two months back the patient suffered from dysentery for 15 days, after that she noticed gradual swelling of the abdomen and later on oedema of feet. She was off and on suffiering from intermittent temperature for these 2 months.

General health was much below average, abdomen enormously distended with fluid. There was oedema of feet and legs. The upper margin of the liver was in the 5th space in the midclavicular line ; the lower margin about ½" below the costal margin. Spleen not palpable. Heart—1st sound, replaced by murmur which is not conducted, over all areas.

Blood Examination Report

on 20.10.34.

Hb.	35%
R. B. C.	1.9 mill
W. B.C.	6,250
Polymorphs	70%
Small mono.	24%
Large mono.	2%
Eosin	4%

Coagulation time		3½ min.
Aldehyde & Chopra's Test		negative
Malaria Parasite		not found
Blood Pressure	Systolic	85 mm of Hg.
	Diastolic	65 „ „
W. R. & Kahn		weakly positive

Biochemical Examination of Blood

N. P. N.	27 mg.
Urea N.	12 mg.

Ascitic Fluid

Whitish yellow, slightly turbid, cellular elements scanty, mostly lymphocytes ; no growth on culture.

W. R. & Kahn	negative
Albumin	0.7%
Globulin	0.73%

Operation on 24.10.34.

On exploration : liver hard ; margin sharp, spleen diminished in size.

Progress

24.10.34 P/R 100/20

1.11.34 Stitches removed. P.U.

Oedematous zone on the right side of suture line.

Measurement (in inches)	20/10	23/10	2/11
Subcostal	26½	27½	27
Umbilical	30½	30½	29½
Urine (in ounces)	14	7	32

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EDITORIAL COMMENTS

Use and Abuse of Hospitals

One of the most remarkable social changes that has taken place in India in recent years is that in relation to hospitals. Even a few years ago people were reluctant to enter an Indian hospital firstly because of gross maladministration, secondly because of religious and other prejudices. In recent years, however, the population has become astonishingly—"hospital minded". The reasons are that with the rapid growth of efficient methods of diagnosis and treatment such as x-rays, pathological laboratories, major surgical operations etc., the hospital has come to be essential for all classes of the community. Secondly, acute economic distress and the widespread unemployment has necessitated admission to hospital for a considerable number of patients who might have otherwise been treated at home.

With this change in the psychology of the people, the administrative authorities of hospitals and medical relief and the profession are faced with newer and difficult problems. There have been greatly increased demand for hospital accommodation, medical schools and colleges. The State hospitals are unable to cope with this call on their resources, and consequently there has arisen a number of private hospitals, some of which are fully equipped modern hospitals and others of very indifferent equipment. Unlike England and other Western countries municipal or county council hospitals are a rarity even now in India.

Bureaucratic administration of state hospitals and need of the private hospitals for funds led to a number of unforseen results. There developed a system of partial payment by the patient for the hospital services he receives, appoinment of so-called honorary medical staff, and indiscriminate medical service to many, who are perhaps able to pay for it.

The general practitioners are thus exposed to very unjust competition by hospitals and particularly the out-patient departments. A large number of general practitioners are, therefore, obliged to consider if they should cooperate in improving the hospital administration or remain as indifferent as hitherto in order to safeguard their own position.

More alarming, however, is the question of admission or rejection of a patient at the hospitals. It is a common practice both in State and private hospitals for cases sent by the Visiting Medical Staff and administrative authorities to be held to have a paramount claim for admission and in fact they obtain admission to the exclusion of local out-patients. Admission or rejection of patients at hospitals has thus passed into hands of Visiting Staff and they are not careful to prevent admission of unsuitable cases. The logical and increasing feeling on the part of the public is, therefore, that the patients sent by the Visiting Staff have a prior claim to admission.

Evils which indiscriminate medical charity is undoubtedly inflicting not only on the medical profession but also on the public, can only be remedied, if provisions, as in the National Health Insurance Act, Hospital Contributory Schemes or Hospital Provident Schemes etc., of England, are made available in India.

It is desirable that accommodation in hospital should be meant for (1) patients acutely ill, (2) patients sufferring from less

serious acute diseases or chronic diseases, (3) sick children, (4) maternity patients and (5) mental patients; and functions of various hospitals should further be to provide (1) for the destitute sick, (2) for teaching of medicine, as well as for the training of nurses and (3) admission of infectious cases. Speaking generally the hospital accommodation ought to be arranged under the following heads (1) general cases, (2) convalescent cases, (3) infectious and (4) chronic cases.

The out-patient department should preeminently be a consultative department for the provision of an accurate diagnosis after careful and detailed examination and also a place for the provision of specialised treatment. Cases of trivial illnesses should not be dealt with at the out-patient department, because many of them can efficiently be treated by the general practitioners.

The medical staffing of hospitals should be on the following lines as suggested by the British Medical Association :

(1) A whole-time Medical Superintendent (resident) with full administrative control.

(2) A whole-time resident staff
(a) senior and (b) junior with responsibility for various classes of patients.

(3) A part-time consultant visiting staff to have responsible charge of beds and clinics.

(4) Clinical assistants, appointed from amongst the practitioners of the area.

The medical staff should be remunerated either by fixed salary or by payment for definite services and responsibility. In this connection we should point out to the suggestion of the B. M. A. that the honorary staff of "voluntary" hospitals of England should have a fund, paid from the contributory scheme, at their disposal, and should be allowed to charge fees from certain classes of patients occupying special rooms etc.

We invite the attention of the medical profession in general to the increasingly difficult problems of hospital administration in all its aspects and would welcome general scheme of hospital grouping, construction, administration and policy.

Calcutta Medical College Centenary

We draw the attention of our readers to the Centenary Appeal for the Medical College Hospitals, Calcutta, published elsewhere in this Journal. The Calcutta Medical College will be celebrating its Centenary in January, 1935.

From a small beginning with a clinical hospital consisting of 30 beds and a small out-patient dispensary, the Medical College with its attached hospitals has grown into one of the biggest modernized teaching institutions. During the 100 years of its existence the Medical College has turned out thousands of trained medical graduates who are carrying on the work of medical relief among the people of various parts not only of Bengal but of whole India. Many graduates have made notable scientific contributions on various branches of medicine, especially tropical diseases, and have earned a deserving reputation for this institution.

It has been decided that on the occasion of this Centenary celebration, a casualty department with all modern equipments should be opened, that the out-patient departments should be centralized and that a suitable supply of radium also should be obtained. These are essential for the modernization of this premier institution. Much money is needed for the fulfilment of these objects in view.

It has been estimated that about five lacs of rupees will have to be collected. Sir Bijoy Prosad Singh Roy, Minister, Local Self Government, Bengal and Lt. Col. T. C. Boyd, the Principal of the Medical College, with other notable signatories have appealed to the generosity of the Indians and Europeans and of the past students of the Medical College who now hold prominent positions in various spheres of life.

We commend this appeal to all men and women of India, who, we hope, will contribute unstintingly for a noble cause.

CURRENT MEDICAL LITERATURE

MEDICINE

Aortic Stenosis

The opening from the left ventricle (*J. A. M. A.*, 610, *Aug.*, 25, 1934) into the aorta is closed during diastole by the aortic semilunar valves. Whenever these three valves become stiffened or fused by disease, the opening into the aorta is narrowed and the free flow of blood from the ventricle is obstructed. True aortic stenosis has been considered rare. Heart disease has, however, become the leading cause of death, and it may be that aortic stenosis occurs more frequently than has been supposed. In reviewing 6,800 necropsy reports of all types of disease at the Massachusetts General Hospital, McGinn and White found 123 cases of aortic stenosis. In a clinical group of 4,800 cardiovascular cases they found 113 cases of aortic stenosis. The incidence in the two groups was therefore 1.8 and 2.3 per cent, respectively, which was higher than had been anticipated.

Since the basal cardiac area has been called the field of romance in diagnosis, it is not strange that the criteria for a diagnosis of aortic stenosis have changed in the last generation. When a basal systolic murmur alone permitted a diagnosis of aortic stenosis, the lesion was diagnosed too frequently. Then followed an overcautious period when the criteria required were a loud aortic systolic murmur, an aortic systolic thrill, absence of the second aortic sound, a plateau or anacrotic pulse, and perhaps an aortic diastolic murmur. The preferable diagnostic position, McGinn and White have found, lies between these extremes. The diagnosis may be justified when there is a harsh and loud aortic systolic murmur transmitted to the neck, whether or not it is accompanied by the foregoing confirmatory signs. A loud systolic murmur in the second right interspace should suggest aortic stenosis when there is evidence of other valvular defects or a history of rheumatic infection and when evidence of syphilitic aortitis or of marked hypertension is absent. It is interesting that a clinical diagnosis had been made in only one third of the 123 cases of aortic stenosis found among the 6,800 necropsies. Aortic stenosis is missed much more often when it is present, the Boston investigators believe, than it is diagnosed when it is absent. A clinical diagnosis of aortic insufficiency was frequently made in this series of cases ; in fact, that lesion also was present in fifty-two of the aortic stenosis cases that came to necropsy. About every third case of mitral stenosis in the necropsy group also presented aortic stenosis. In the clinical group the ratio was much lower, but in the second half of this group, when perhaps the investigators were more zealous, twice as many cases of aortic stenosis were discovered as in the first half of the series.

There was a history of an important infection in one third of the necropsy cases of aortic stenosis and in one half of the clinical cases. The infections most frequently recorded were tonsillitis, pneumonia, influenza, typhoid and gonorrhœa. Syphilis was not diagnosed in any case in the clinical series and in only four cases in the necropsy series.

The patients complained commonly of dyspnea, orthopnea and edema, and of faintness or dizziness or actual syncope. About 19 per cent of the patients had angina pectoris and 15 per cent cardiac asthma. The pulse was described as normal in the majority of these cases. A Corrigan pulse was noted in only twelve cases in the entire series, and a plateau pulse was noted in only nine cases. The diastolic blood pressure varied between 80 and 110 mm. of mercury. The average pulse pressure was unexpectedly high, 60 mm. of mercury. There was cardiac enlargement to the left found in all but ten of the total number of cases. Sometimes the flouroscope would reveal the calicified aortic valves. The most common observation in the electrocardiogram was left axis devation, although in some cases it was not present. Abnormal T waves exclusive of bundle branch block cases were present in sixty-six of the 110 electrocardiograms.

Of the 236 patients with aortic stenosis 172 were known to be dead ; twelve died following operations and nine others died suddenly. The majority died of congestive heart failure. The average number of attacks of congestive failure was two.

From this study it is evident that all grades of aortic stenosis exist. The lesion is not uncommon, specially in males. While it is less serious than aortic regurgitation, aortic stenosis is important even if mild, because of the progressive nature of the lesions and and because of its association with congestive heart failure. The detection of such cases is clearly dependent on the fine application of the physical diagnostic art. The making of a correct diagnosis in only one third of the instances established post-mortem is an indication of the necessity for more attention to this phase of medical practice.

J. C. B.

The "Q" Deflection in Human Electrocardiograms

From an analytical study of normal and abnormal human electrocardiograms CHARLES SHOOKHOFF and ALBERT H. DOUGLAS (*Annals Int. Med.*, 190, 1934) summarise their observations as follows :

1. In normal ventriculograms Q_1, Q_2 and Q_3 correspond in time with reasonable accuracy. In normal ventriculograms, therefore, the term "Q" represents a physiological entity and determination of its significance can be attempted.

2. In ventriculograms of the large Q_3 type, Q_3 does not correspond in time with Q_1 or Q_2. The time represented by Q_3 in 50 of the tracings studied was in no case identical with that occupied by Q_1 and Q_2. In most of these tracings part of Q_3 corresponded in time with parts of R_1 and R_2. In many of these tracings Q_2 corresponded more or less accurately in time with R_1 or R_2.

3. There is evidence to show that a large Q_3 is usually associated with characteristic changes in R and S—suggesting an alteration in the ventricle as a whole, rather than in one part of it in these cases.

4. It is suggested that a large Q might be indicative of a rotation of the ventricular electrical axis around a longitudinal axis ; rotation to the left producing a large Q_3, and rotation to the right a large Q_1.

5. Such rotation could be the result : (a) of mechanical factors changing the position of the ventricle ; (b) of a change in the position of the leads, causing a relative rotation of the heart ; (c) of damage to one part of the ventricular musculature with collapse, the contraction of scar tissue, or dilatation of the damaged area ; (d) thickening of one part of the ventricular musculature.

6. In a particular electrocardiogram there is no more reason for considering a large Q_3 indicative of coronary artery or myocardial disease than there is for regarding a deep S_3 as indicative of hypertrophy of the left ventricle. The others believe that a large Q_3, like a deep S_3, is caused by a change in the relative position of ventricular musculature—for which many different causes may be responsible.

J. C. B.

Galactose and Urobilinogen Tests in Differential Diagnosis of Obstructive and Intrahepatic Jaundice.

D. H. ROSENBERG (*Annals Int. Med.*, 69, *July* 1934) as a result of his studies in a series of 30 selected cases of jaundice reports that galactose and urobilinogen determinations were made on 12 cases of acute and subacute intrahepatic jaundice, two cases of chronic intrahepatic jaundice and 16 cases of obstructive jaundice. Seven cases of acute and subacute intrahepatic jaundice yielded abnormal galactose responses. Of the remaining five with a normal response, in two the jaundice was already subsiding when the galactose test was performed. Urobilinogen was detected in the urine of all cases of this group at one time or another. The galactose test was normal and the urobilinogen test was strongly positive in both cases of chronic intrahepatic jaundice. In the obstructive group the galactose test was uniformly negative. Urobilinogen was absent from the urine of all cases of complete obstruction. The author points out that individually, these tests are worthy of clinical acceptance, although from his study the urobilinogen test seems the more reliable.

In the routine clinical study of jaundice, he advocates the utilization of both the galactose and the urobilinogen (urinary) tests.

J. C. B.

Significance of Tubercle Bacilli in Urine

H. WILDBOLZ (*München. Med. Woch.*, 81 : 1012, *July*, 1934 ; *Ref. J. A.M. A. Aug.* 1934) points out that formerly the presence of tubercle bacili in the urine was considered indicative of a tuberculous disorder in the urogenital system. Some of the more recent investigations, however, have called the general validity of this rule into question. The author mentions several investigators who have reported cases of tuberculous bacilluria without the presence of tuberculous disease of the kidney. However, the majority of workers, studying the problem of tuberculous bacilluria, agree that, if it occurs at all, it is extraordinarily rare. The author states that the practitioner should assume the presence of a tuberculous disease of the urogenital organs when tubercle bacilli are found in the catheter urine. It is, of course, possible to mistake smegma bacilli for tubercle bacilli, but, if attention is given to the arrangement of the microrganisms, differentiation is readily possible, for the smegma bacilli are never close together but either are scattered or appear in loose groups. Moreover, they are generally shorter and plumper than the long and small tubercle bacilli. Because of their lipoid covering, the tubercle bacilli are usually massed together. The presence of other signs of urogenital tuberculosis dispels the doubts about the nature of the acid fast bacilli. Such signs are, in men, infiltrations in the seminal vesicles and in the prostate or nodules in the epididymis ; in women, infiltration of a ureter, which can be felt in the anterior vaginal vault. But if in addition to the acid-fast bacilli, no other tuberculous changes are demonstrable and a cystoscopic examination is not feasible, animal experiments, should be resorted to. If the animals develop tuberculosis a urogenital tuberculosis can be assumed even if there are no other signs of tuberculosis, and the physician should see to it that the patient is subjected to a careful urologic examination. The good general condition and the absence of renal and vesical symptoms should not tempt the physicians to regard the presence of tubercle bacilli in the urine as of minor importance, for not only is the patient in danger himself but he is also a danger to those who come in contact with him. The author maintains that the majority of patients whose urine contains tubercle bacilli have a caseous tuberculous lesion of the kidneys, genital tuberculosis being much less frequent. Since renal tuberculosis has only a slight tendency to scar formation, nonsurgical methods are of little avail, but surgical removal of the diseased kidney leads to complete cure in approximately 60 per cent of the cases. However, in some patients nephrectomy is contraindicated ; this is the case particularly in bilateral tuberculosis, but even in unilateral renal tuberculosis nephrectomy may be inadvisable. Nonsurgical treatment should first be tried in all cases in which little or no pus is found in the urine and in which the function of the kidney is satisfactory.

J. C. B.

Indications for Treatment in Neurosyphilis

H. WEIGEL (*Monatschr. Psych. und Neurol.* 89 : 46-53, June, 1934 ; *Ref. Med. Times ;* Sept. 1934) emphasizes the importance of the examination of the cerebrospinal fluid for three or four years after the initial infection in every case of syphilis, if the development of neuro-syphilis is to be prevented or checked. In the examination of the spinal fluid, not merely a positive Wassermann or positive colloidal reaction is to be considered of importance, but also an increase in the cell count and in albumin, as the latter are the first to develop with any beginning involvement of the central nervous system. In cases of syphilis that have been adequately treated and show a negative blood Wassermann, the cerebrospinal fluid should be examined at three-months' intervals for at least three years ; if it remains normal, no further treatment is necessary. If the cerebrospinal fluid becomes positive, intensive specific treatment should be given ; if it does not return to normal or if neurological symptoms develop, some form of fever treatment should also be used. In cases not adequately treated in the early stages with positive blood Wassermann, another course of specific treatment should be given even if the

spinal fluid is negative. If the patient is not examined until more than three years after the initial infection, the spinal fluid should always be examined whether the blood Wassermann is positive or not. If the fluid shows any positive reaction, some form of fever treatment followed by specific treatment should be given ; in cases never treated adequately, malarial treatment is the method of choice. In cases with symptoms of cerebrospinal syphilis, various methods of producing fever may be used ; but in paresis the author believes malarial treatment is the method of choice. This should be followed by neosalvarsan. In tabes, the author believes, the value of malarial treatment is doubtful, some milder form of fever treatment (non-specific protein injections, etc.) is preferable ; if the spinal fluid is strongly positive this should be followed by neosalvarsan. In cases of tabes with normal spinal fluid, any form of specific therapy is to be avoided, and only symptomatic treatment is indicated.

J. C. B.

Gastric Acidity in Carcinoma of the Stomach

M. W. COMFORT and F. R. VANZANT (*Proc. Staff Meet. Mayo Clin.* 8 : 271-273, 1933) using the test meal for gastric analysis, have studied the records of 619 men and 186 women with carcinoma of the stomach observed in the Mayo Clinic from 1927 to 1931 inclusive. Comparing the acidity with the normals previously established by Vanzant, they find the incidence of achlorhydria three times as great as in normal persons. The mean free acidity was lowered 15 points in men and 8 points in women. The total acidity in patients with free hydrochloric acid present was slightly lower than normal, but in those with achlorhydria it was slighty above normal. The percentage of achlorhydria increased with age, as in normal individuals, the relative frequency being greater. Anæmia, loss of weight, location of the growth, and the volume of gastric contents did not materially affect the gastric acidity.

Dividing the patients into groups according to their symptoms, the authors found that in patients with a typical ulcer history, the incidence of achlorhydria and the range of free acidity were practically normal. In individuals with non-ulcer symptoms, on the other hand, the incidence of achlorhydria was four times the normal, the range of free acidity was shortened by 40 units, and the mean free acidity was lowered 20 units in men and 10 in women. In the group presenting pseudo-ulcer symptoms the acidity curve lay between those of the two preceding groups but slightly nearer the non-ulcer group. It is concluded therefore, that in non-ulcer group carcinoma often develops in the anacid stomach, while in the ulcer-like group the growth begins in a normally acid stomach.

Discussing the paper, Alvarez brought out the fact that since the location of the growth has little effect on the acidity the depression of acid cannot be due solely to the destruction of secreting tissue.

G. M.

PATHOLOGY & BACTERIOLOGY

A Study of the Bacterial Capsules by new methods

J. W. CHURCHMAN and N. V. EMELIANOFF (*J. Exper Med.*, Vol. 57, 485, 1933) have described a new technique for the staining of bacterial capsules. They state that best results have been obtained when young organisisms (not more than 18 hour's old) from a culture on solid media were used for study, although capsules have also been stained in smears from broth cultures and from sputum. Use is only made of stain and fixative which are applied together. No steps are taken which are designed to render the capsule more readily demonstrable but are likely also to produce somewhat artificial conditions. Films are made from aqueous suspensions of the bacteria and these are air-dried. They are then covered with ten drops of freshly filtered Wright's stain which is left on until it has evaporated nearly but not quite, to dryness, when a purplish pink replaces the original colour of the Wright's stain. It is probable that staining of the capsule occurs just at this instant. The evaporation usually requires about three minutes. The stain is washed off as rapidly as possible with Clark and Lub's buffer PH 6.4 to 6.5 and immediately dried with a fan without blotting. Sometimes the capsule is more satisfactorily stained if the film is rapidly washed with distilled water after the buffer has been used. Excellent specimens may be obtained by leaving the air-dried film

in Wright's stain overnight, removing and allowing stain to evaporate as described, then washing rapidly with buffer and drying with the electric fan. By this method bacterial somata is stained blue, the capsular substance pale purplish pink and the periphery of the capsule deep purplish pink. Failures may be due to washing with buffer solution before evaporation of stain has gone far enough or the stained films are washed too long. D. N. C.

Factors Influencing the Pathogenecity of Bacteria

F. H. TEALE (*J. Path. and Bact.*, Vol. 37, 1933) has described some interesting facts which influence the pathogenicity of bacteria. These facts have been supported by experimental evidence. He states that : (*a*) the washed spores of ordinarily pathogenic bacteria germinate in animal body, but do not multiply and also do not secrete their toxic substances, (*b*) if the organism is highly virulent the spores germinate and produce fatal results. The vegetative forms therefore originating from the spores of virulent organisms are capable of multiplying and producing fatal results, whereas those derived from nonvirulent forms are incapable of doing so. This must indicate that the vegetative forms of virulent strains are capable in themselves of creating the conditions in the infected tissues necessary for their growth and multiplication ; (*c*) if the organisms are introduced into the body in such a way that there is no concomitant tissue damage, no pathogenic results ensue if the organisms are ordinarily pathogenic. If highly virulent strains are used, fatal infection will ensue even in the absence of tissue damage, e.g. Bact. enteritidis or Bact. Shiga probably as a result of their toxins, (*d*) the suggestion of Besredka that certain organisms are dermatotropic is not true as by experiments it has been proved that those dermatotropic(?) bacteria can attain the necessary degree of infectivity without having gained accesses to the dermal tissue ; (*e*) these bacteria can initiate infection if introduced into tissues other than the skin ; (*f*) at the site of introduction there need not necessarily be caused an area of damage to form a nidus where the bacteria can multiply. Various chemicals and tissue products etc., may activate an infection without forming a nidus of lowered resistance to the bacteria. (*g*) Aggresins in the sense of Bail do not exist : (*h*) any influence they may have in stimulating infection is due to either the anaphylotoxin or the bacterial products present or due to both. Virulins in the sense of Rosenow also have not been proved to aid infectivity. (*i*) Aggresive fluids if sterile do not confer immunity and there is no difference in the fluids derived from highly virulent infections or from those of much lower infectivity. (*j*) The susceptibility to infection does not occur where the so called negative phase should be lowest but about 7 days after the inoculation of the sensitising doses when the antibody formation is well in progress. Taking all the above together it would appear that there are certain bacteria whose endotoxic content is very low, which can produce a fatal infection only when there is such an amount of specific antibody present in the tissues of the infected animal that the interaction between the bacteria and antibody stimulates the bacteria to multiplication and produces sufficient tissue change to enable a fatal infection to occur. The primary factor must be the stimulus to bacterial growth by the interaction and damage to the cells must be of secondary importance since damage caused by other means does not cause fatal infection. Occasionally animals which have been immunised by repeated injections die rapidly with a violent reaction with a dose of the specific bacteria which they have previously borne without any manifestation of illness.

The hypersensitiveness to the bacterial protein induced by the repeated inoculations may be responsible for this. There is no relation between the degree of removal of the antitrypsin inhibition and the virulence of an infecting organism. Similar alteration in antitrypsin occurs when an absolutely innocuous protein or other substance is inoculated. Virulence is usually a property acquired by habituating the organism to the tissues of the host, enabling it to withstand their defences and to multiply in the pabulum it finds there and therefore varies according to the host. It seems as if this depends on a special ferment developed by the bacteria or a ferment adaptable to the different animal species whereby the bacteria is able to make use of the pabulum. It is not wholly dependent on the carbohydrate

substance since very avirulent forms of pathogenic organisms may be typically smooth, have the specific reactive properties and contain the specific carbohydrate substance. In Griffith's experiments the "R" pneumococci acquired not only the carbohydrate substance but also the virulence of the "S" forms used as the substrate. In the tissues of an immunised animal "S" forms do not readily become converted into the corresponding "R" forms.

D. N. C.

The Envelope Antigen of B. Pestis and its Antibody

HARRY SCHUTZE (*Brit. J. Exper. Path*; Vol. XV. 200, 1934,) has shown that envelope antigen can be readily haptenized by exposure to heat. Half an hour's heating at 70°C. so damages the antigen that it is almost incapable of producting precipitins in the rabbit. Its sensitiveness towards acid and alkali is indicated by the fact that N/8 acetic acid, acting at 100°C. for 15 minutes, completely destroys the antigen and that N/8 sodium hydroxide does the same after 1 hour at 60°C. Less complete damage results from slighter degrees of alkalinity, such as are present in most antiplague vaccines, and from lower temperatures as used in their sterilization. Three days' agar grown culture of B. pestis suspended in saline will have a pH of 8.0 or over. After sterilization at 56°C. for half an hour the efficiency of the product as an antigen capable of evoking antibody in the rabbit is considerably lowered. This can be avoided by neutralizing the vaccine with acetic acid before sterilization. After such treatment the average precipitin titre obtained will be twice or four times that obtained with the unneutralized vaccine. These experiments suggest that a similar increase in the prophylactic power of the vaccine would also result if its antigen were protected from the damaging effect of an alkaline environment.

D. N. C.

Chemistry of Blood from Cancer Patients

ANNA GOLDFEDER, (*Ztschr. f. Krebsforsch.* 40: 394-409, 1934) reports that nitrogen values in the blood of 30 cancer patients, as determined by a new method (Folin), were within normal limits except in the case of amino-acid nitrogen, which averaged somewhat higher. There was no evidence to suggest the presence of any specific or unfamiliar nitrogenous substance.

In 25 patients with cancer the fibrinogen and globulin were high in comparison with that found in 6 normal persons. Serum albumin values, on the contrary, were normal.

Blood phosphorus was augmented in 18 cancer patients, but as this is high in certain other diseases it may be concluded that variations in the phosphorus content depend upon the general condition of the organism and are not specific for cancer, as some investigators have suggested. Increase in amino-acids and in fibrinogen and globulin also accompany conditions other than malignant disease, so that none of the changes described can be regarded as peculiar to cancer.

G. M.

Cholesterol Metabolism in Cancer Patients

O. KINGREEN (*Arch. f. klin. Chir.*, 177: 383-386, 1933) remarks that he, like various writers on the subject, has observed considerable variation in the cholesterol metabolism of normal persons and of patients suffering from carcinoma and other diseases. He points out that before making serum cholesterol determinations a standard diet should be given for at least four days, and that even then the normal figure varies from 120 to 180 mg. per cent. In the great majority of 71 cancer patients the figures obtained were only slightly above the normal range. Low normal and subnormal values were mostly found in markedly cachectic patients, especially those with metastases. It was noted that when a cancer was radically extirpated the serum cholesterol rose, whereas when a primary tumor was removed, but not the regional or other affected lymph nodes or metastases, the value fell.

Comparison of the cholesterol before and after irradiation in operable cases, especially those of gastric cancer with liver metastases, showed a gradual rise after treatment; in these patients, as already noted, the value before treatment was low. On the other hand, when a

patient who had been radically operated upon was given x-rays or radium, there was no further appreciable change in the serum cholesterol. The author concludes that the chief storage places for cholesterol are the liver, spleen suprarenal glands, and sexual glands, and that further investigation is necessary before it can be definitely stated that serum cholesterol determinations are of any value to the surgeon or the radiotherapist.

G. M.

SURGERY

Metastases of Carcinoma to the Spleen

To find the truth of the different assertions that carcinomatous metastases are rare in the spleen due to various factors viz., due to absence of lymph channels in the pulp, the sharp angle which the splenic artery makes with the aorta, the rhythmic contraction of the spleen itself and its being a member of the reticulo-endothelial system, SHIELDS WARREN and HOBSON DAVIS (*Am. J. Cancer*, 21 : 3, 1934) studied 1140 consecutive cases of carcinoma from five different hospitals.

Their observations are as follows :

In every case where the spleen was involved there were also metastases to three or more organs.

The form of grossly visible metastases varied widely from single or multiple macroscopic nodules, sharply demarcated from the splenic tissue or some time partly encapsulated by connective tissue to diffuse growth infiltrating the parenchyma.

The spleen and the kidneys exhibited some similarities in their behaviour and involvement.

In 1140 autopsies on carcinoma patients metastatic carcinoma to the spleen was found in 46 or 4 per cent of cases as compared to 52 cases or 4.6 per cent metastasizing to one or both kidneys. Nine gave metastases to both organs.

Splenic metastases were recognised grossly in 56.5 per cent of the 46 cases.

Twenty-six of the 46 cases showed metastases to the splenic parenchyma without involvement of the capsule. Cases with involvement of the capsule were not included.

Of 193 carcinomata arising in the breast 15 per cent metastasized to the spleen.

In the group of carcinoma simplex 12 per cent metastasized to the spleen.

In every case where the spleen was involved there were also metastases to three or more other organs.

Carcinoma of the breast metastasized almost twice as frequently to the spleen as the kidney. On the other hand carcinoma of the cervix metastasized almost three times as frequently to the kidney as to the spleen.

The frequency of metastasis to spleen and to kidney was closely parallel in this series.

G. M.

Carcinoma of the Appendix with Intussusception

C. W. MAYO, (*Proc. Staff. Meet., Mayo Clin.* 8 : 669-671, 1933) reports on a case as follows :

A woman aged forty-two years had noticed a mass in the right lower abdomen for several months. The mass varied in size producing occasional sharp abdominal pains and moderate diarrhoea ? Examination revealed a hard, freely movable, non-tender mass in the right region of the cecum. Roentgenograms suggested a polypoid tumor of the cecum tending to produce intussusception. At operation a mass was found at the ileocecal juncture, with surrounding inflammatory reaction. A right colectomy was performed with subsequent ileo-colostomy. The specimen proved to be a papillary adenocarcinoma of the appendix projecting into the cecum and causing intussusception. No metastases were found.

Reviewing the cases of intussusception the author finds that, whereas in acute cases no etiological factor is usually found, the reverse is true when the condition is chronic. Of the 41 cases of this type, 65.8 per cent were caused by malignant disease. Surgical resection is, therefore, always the treatment of choice. There are no illustrations. The fate of the patient is not mentioned.

G. M.

Malignancy of the Tonsil

W. E. COSTOLLOW, (*Am. J. Surg.*, 23 : 528-531, 1934) reports 39 cases of cancer of the

tonsil treated between 1922 and 1931. Twenty-seven cases were carcinoma; 12 were lymphosarcoma. Nearly all were in an advanced stage, and 90 per cent of the patients had metastatic nodes at the time of admission. In the treatment of these patients, the author employed filtered radium element, applied to the tonsil areas, combined with external radiation by by x-ray and radium element pack. Radon seeds were employed in a few cases. Operable metastatic nodes were treated by surgical removal, followed by radium implantation or external radiation. Extensive fixed lymph node metastases were treated by x-rays alone; 77.8 per cent. of the cases of carcinoma were in this group.

In the series of 39 patients, 35 of whom were in an advanced stage, primary healing occurred in 25.9 per cent, and this percentage of patients remained free of diseases for one year. After two years only 11.1 per cent were clinically free of disease; by the end of the third year this figure had fallen to 3.7 per cent.

G. M.

Curability of Carcinoma of the Larynx

Contrary to commomly accepted views, G. B. New and J. M. Waugh (*Proc. Staff Meet. Mayo Clin.* 8 : 757-758, 1933) point out that surgery in the treatment of carcinoma of the larnyx has met with striking success (thus agreeing with Thompson), not only in producing a high percentage of cures with a low operative mortality but in causing a minimum of functional impairment, even after radical procedures. The type of operation depends upon the extent of the growth, its location, the degree of malignancy, and the condition of the patient. In carcinoma of the epiglottis, usually of low-grade malignancy, tracheotomy followed by removal with surgical diathermy has produced uniformly good results. For early carcinomas involving the anterior two-thirds of the vocal cords thyrotomy with excision of the growth and destruction of the base is sufficient. If the growth is highly malignant and there exists a possibility of lymphatic extension, laryngectomy is the procedure of choice. Pharyngotomy is indicated for advanced lesions in the region of the epiglottis, base of the tongue, aryepiglottic fold, and postcricoid region.

Thyrotomy performed in 75 consecutive cases resulted in no postoperative deaths. Of 60 patients in which total laryngectomy was done, only one died of operative complications. Of all patients operated on in the Mayo Clinic previous to 1928, 107 have been traced. Of this group, 34 were subjected to thyrotomy and 28 or 82.3 per cent. have survived five years or more. In the larger group of 73, in which laryngectomy was necessary, 41 or 56.1 per cent lived a similar length of time.

The authors emphasize the exceptional rehabilitation of the patients as regards voice function in the majority of instances. Following conservative procedures almost all of the patients develop useful voices, while those requiring laryngectomy are usually taught to speak either with the pharyngeal or with an artificial larynx.

G. M.

Curability of Carcinoma of the Tongue

E. S. Judd and J. R. Phillips (*Proc. Staff Meet. Mayo Clin.* 9 : 8-11, 1934), reported four selected cases of carcinoma of the tongue in order to show that the disease is curable, even after it has become extensive. One patient, a man of thirty-three, was treated by cautery excision of the primary tumor, block dissection of the left side of the neck, and removal of the submental and submaxillary lymph nodes. Three months later a local recurrence in the tongue was excised. The tumour was a squamous carcinoma, Grade III. The patient has remained well twenty-one years.

In a second patient, a woman of fifty-eight, a recurrent carcinoma of the tongue was treated by surgical excision and extirpation of the submental and submaxillary lymph nodes. The tumour was a squamous carcinoma, Grade II. The patient is living, free of disease, twenty-one years later.

A third patient, a sixty-three year-old man, had an extensive, ulcerated carcinoma of the under surface of the tongue. Treatment consisted of cautery excision and dissection of the submental and submaxillary nodes of both sides of the neck. At the end of eight years a local recurrence developed. This was excised by surgical diathermy. The tumor was a

squamous carcinoma, Grade II. The patient is now well, fourteen years after the first operation.

The present practice at the Mayo Clinic is to excise the primary tumor by diathermy; in more extensive cases radium is inserted into the wound at the time of operation. Carcinomas of the base of the tongue, which are nearly always Grade IV tumors, are treated by insertion of radium if they are too extensive for removal by diathermy. The regional lymph nodes are routinely dissected. If the nodes are found to be involved, external radiation is employed postoperatively.

G. M.

RADIOLOGY & ELECTROTHERAPEUTICS

The Latent Period in the Roentgen Diagnosis of Pulmonary Tuberculosis

Leo G. Rigler and Frederick B. Exner (*J. A. M. A.*, May 26, 1934 *Ref. Med. Times;* Aug., 1934) observed a number of cases of pulmonary tuberculosis developing in medical students and interns who have previously had repeated tuberculin skin tests, chiefly by the Mantoux method. They have therefore been able in some of these cases to trace exactly the time of onset of the infection and the period of time that elapsed before roentgen signs in the lungs became apparent. It appears that an interval of from eleven to twenty-four weeks may elapse from the occurrence of a tuberculous infection to the development of roentgen signs that are susceptible of interpretation as indicating pulmonary tuberculosis. This obviously represents only the minimal time. It is possible that in some cases the minimal time may be even less. This might have been demonstrated if roentgenograms had been made at weekly intervals after the occurrence of the positive skin test. What the maximal time would be it is impossible to state. It is striking that the roentgenographic manifestations should appear so quickly, and it is notable that in none of these cases were there any physical changes determined. The symptoms in several of the cases were negligible or absent. In the others the symptoms were conditioned by acute pleurisy or the presence of tuberculous lymph nodes. The data tend to confirm the assertion that the roentgenogram is a most sensitive method of detecting pulmonary tuberculosis in its earliest stages. It also has a bearing on the question of when it would be wise to make a roentgen examination of an individual after a tuberculous contact to determine whether an infection has occurred. It is evident that rarely will any information be obtained in this way until after the skin test becomes positive. Following this, a latent period of three to six months, possibly less, must elapse before any roentgen changes will appear.

J. C. B.

Irradiation of Uterine Carcinoma in the Woman's Clinic of the University of Heidelberg

F. G. Dietel. (*Strahlentherapie* 46: 201-171, 1933).

This voluminous work is a statistical survey of the carcinomas of the uterus treated by x-rays, radium, or both between the years 1913 and 1924. The total number treated was 542. Of these, 446 were located in the cervix; 185 or 41.5 per cent. were operable. Of these latter number, 170 were irradiated and five-year cures were obtained in 40.6 per cent. Irradiation of 237 inoperable cases resulted in apparent cures in 10.5 per cent. Sixteen patients died as a result of the treatment, 15 from peritonitis and sepsis and one from embolus. Operability decreased with age, that is to say the operability was greater in the younger patients. Recovery showed a similar predilection for youth. The incidences of cervical cancer was greatest between thirty-five and fifty-five years, and was inversely proportional to the number of children borne by the patient. Eight patients had recurrences of the cancer more than seven years after treatment, the longest interval being thirteen years.

There were 96 carcinomas of the body of the uterus. Of these, 87, or 90.6 per cent. were operable; 83 were treated and 33.7 per cent ostensibly cured. Both of the patients with inoperable tumors survived longer than a few months after treatment. Two treated patients died from immediate complications, one of peritonitis and one from pneumonia. Again the operability and the curability decreased with advanced age. The highest incidence fell between forty-five and sixty-five years of age.

As a general rule, with modifications, Dietel favors irradiation, followed in refractory cases by operation. Massive doses given in a single application are thought to be most effective. The dosage and technic of treatment are discussed at great length, but for these the reader must consult the original.

This is a comprehensive and valuable accumulation of statistical data. It contains 22 illustrations.

G. M.

Advances in the Treatment of Breast Carcinoma

O. JUNGLING, (*Fortschr d. Therap.*, 9: 136-139, 1933) referring to the statistical reports of Greenough and of the Radiumhemmet in Stockholm. says that he has recently been convinced of the value of preoperative and postoperative roentgen therapy, and now also uses radium needles after the manner of Sampson-Handley in the supraclavicular and infraclavicular fossae and in the first three or four intercostal spaces close to the sternum. On the other hand, he is not impressed with Wintz method of x-radiation followed by operation without attacking the regional lymph nodes, nor by his complementary roentgen castration. Palliative roentgen radiation is still the best treatment for inoperable cases, skin, pleural, and bone metastases,and pathological fractures.

Jungling now gives a total preoperative irradiation of 150 per cent. S. E. D. during five to ten days. He operates several weeks later, using the diathermy knife for all local excisions for frozen section diagnosis and preferably also for the radical excision, inserts 20 mg. radium needles and then postpones the postoperative roentgen irradiation for several weeks. During three to five months 120 to 150 per cent. S. E. D. is given divided over two or three series.

G. M.

PEDIATRICS

Tuberculosis in Infants and Primitive Races

W. MYERS JOHNSON and J. ARTHUR MYERS, (*Am. Rev. Tuberc.*, 28: Sept. 1933, Ref. *Am. J. Dis. Child.*, Aug. 1934) point out that the first infection type of tuberculosis in infants, whether or not the lesion can be located, is rarely, if ever, fatal; but it results in allergy which makes reinfection from exogenous or endogenous sources dangerous. The first infection and reinfection types of tuberculosis are almost like two distinct disease entities as far as their attack on the body is concerned. In infancy and in all other age periods the type which usually results in disability and death is the reinfection or adult type. The use of tuberculin tests and x-ray films demonstrates the fact that the lesions in the chest of Indians and of white persons are identical. The higher incidence of positive reactors among Indians results from lack of preventive measures in the care of patients with open cases of tuberculosis among them. All positive reactors to tuberculin have the first infection type of tuberculosis and, therefore, are potential cases of the reinfection type of the disease. Therefore, since the incidence of positive reactors is so high among children, a high incidence of a destructive type of disease is to be expected among adults. Observations on Negroes show that they also react in the same manner to the first infection type of tuberculosis as do other races. The reaction to the first infection type among persons of Mexican nationality is apparently no different from that found in other races and nationalities. One of the most encouraging facts brought to light through recent observations and studies is that infants and primitive races have remarkable ability to control the first infection type of tuberculosis,and that apparently the only serious factor with which one has to contend in the control of tuberculosis among them is the communicability of the disease, as is true in all other age periods and in other races and nationalities.

J. C. B.

The Diabetic Child

In a consideration of the etiological factors of diabetes in childhood HENRY J. JOHN (*Annals Int. Med.*, 211, Aug. 1934,) stresses on the following points:

1. The average percentage of cases of diabetes in children in which heredity was an etiologic factor in a series of 1,413 cases from the literature was 30.8 per cent. In his series of 214 cases of diabetes in children the hereditary incidence was 18.7 per cent. In Jewish children there was a herediatry influence in 39 per cent.

as contrasted with 19.4 per cent in Gentile children. In his own series, the incidence in Jewish children was 30 per cent and 17.9 per cent in the Gentile group. Diabetes apparently is a recessive character according to the hereditary laws of Mendel. A study of diabetic twins in 19 pairs of twins according to the time interval between the onset of diabetes in each pair showed that the onset in three pairs was simultaneous and in four pairs within 12 weeks of each other.

2. Infection in diabetic children requires close and adequate management if the child is to emerge from it without further impairment of sugar tolerance. In his own series of diabetic children, in nine cases, or 4.2 per cent, the onset of diabetes followed within 10 days after the infection ; in six cases, or 2.8 per cent, the onset was within 20 days ; in 45 cases, or 21 per cent, the onset was within 60 days. The onset of diabetes may follow any acute infection and every child should have a weekly urine examination until there is ample evidence that sugar is being utilized normally. In the early stages of diabetes, the process is to a certain extent still a reversible one whereas at a later stage no repair is possible.

3. Comparative studies of glucose tolerance tests in children and in adults having various affections present a striking and an interesting contrast between the two groups in obesity and hyperthyroidism. In rheumatism and glycosuria and hypopituitarism they are practically alike.

4. Obesity in the adult presents a high incidence of diabetes, as much as five times the general incidence of the disease. Obesity in children does not present a major etiologic problem.

5. Arteriosclerosis is not a causative factor of juvenile diabetes.

6. Hyperthyroidism plays an insignificant rôle as a causative factor in diabetes in children as contrasted with the same condition in adults. However, nonphysiological hyperglycemia during active hyperthyroidism should not be disregarded and the child should be given protection during this period until the carbohydrate metabolism has returned to its normal function.

7. Lues can be disregarded as a causative factor of diabetes in children.

J. C. B.

ASSOCIATION NOTES

XI—ALL INDIA MEDICAL CONFERENCE

Delhi

Election of office bearers of the Reception Committee and Working Committee

At a meeting of XI-All India Medical Conference Reception Committee held at D. M. A. House, Darya Ganj Delhi, on Monday the 8th October 1934, the office-bearers and different Working Committees were elected as follows :—

Chairman Reception Committee—Dr. M. A. Ansari M.D., M.S.

Vice-Presidents—1. Col. W. C. Paton, I.M.S.
2. Dr. A. C. Sen, L.M.S.

General Secretary—Dr. G. N. Khanna, M.B.B.S.

Auditor Mr. B. R. Tannon of Messrs. Tannon & Co., *Chartered Accountants.*

Working Committee will consist of the following :—

	Total
Chairman Reception Committee ..	.. 1
General Secretary ..	.. 1
Vice-Chairman ..	.. 2
President of each Working Sub-Committee ..	.. 7
Secretary of each Working Sub-Committee	.. 7
Two other members elected out of each Working Sub-Committees	14
Total	..32

Quorum of Working Committee will be one fifth of the total.

Quorum of each Sub-Committee meeting will be three.

SUB-COMMITTEES

Finance Committee

Dr. J. K. Sen *Chairman*
,, K. N. Bose *Secretary*

Members :—
1. Dr. G. N. Khanna.
2. ,, P. N. Sen.
3. ,, P. D. Kapur.
4. ,, S. C. Sen.
5. ,, Mool Singh Bazaz.
6. ,, S. B. Mathur.
7. ,, Harkirath Singh Dhupia.
8. ,, I. T. Mittra.

Resolution Committee

2. Dr. A. C. Sen *Chairman*
,, C. P. Chaube *Secretary*

Members :—
1. Dr. Mool Singh Bazaz.
2. ,, J. K. Sen.
3. ,, S. K. Sen (New-Delhi).
4. ,, A. Roy Chowdhury.
5. ,, Moti Ram.
6. ,, A. P. Bannerji.

Publicity Committee

3. Dr. A. C. Sen, *Chairman*
,, G. N. Khanna. *Secretary*

Members :—
1. Dr. K. N. Sharma.
2. ,, A. Batty.
3. ,, S. K. Sen (New-Delhi).
4. ,, H. Sen.
5. ,, R. S. Mishra.
6. ,, B. C. Sen.
7. ,, Harkirath Singh Dhupia.

Exhibition Committee

4. Dr. N. C. Joshi, *Chairman*
,, B. M. Sharma, *Secretary*

Members :—

1. Dr. G. N. Khanna.
2. ,, S. C. Sen.
3. ,, Mool Singh Bazaz.
4. ,, R. B. Hari Ram.
5. ,, A. Batty.
6. ,, N. Sen.
7. ,, P. L. Nirula.
8. ,, Prem Narain Rohtagi.
9. ,, B. Bannerji.

Accommodation & Entertainment Committee

5. Dr. J. K. Sen, *Chairman*
,, Mool Singh Bazaz, *Secretary*

Members :—

1. Dr. R. B. Hari Ram.
2. ,, J. P. Ganguli.
3. ,, S. R. Chopra.
4. ,, P. L. Nirula.
5. ,, Sardari Lal.
6. ,, K. N. Bose.
7. ,, P. K. Ghose.

Scientific Committee

6. Lt. Col. W. C. Paton, *Chairman*
Dr. S. C. Sen, *Secretary*

Members :—

1. Dr. S. N. Mitter.
2. ,, R. S. M'shra.
3. ,, Miss Helen M. Franklin.
4. ,, ,, H. L. Keane.
5. ,, ,, Morris.
6. ,, ,, S. Chowdhury.
7. ,, ,, N. C. Joshi.
8. ,, ,, P. N. Bhargava.
9. ,, ,, Harsukh Rai.
10. ,, ,, Hakim Din.
11. ,, ,, S. K. Sen.
12. ,, ,, A. Roy Chowdhury.
13. ,, ,, C. P. Chaube.
14. ,, ,, S. K. Sen.

Volunteers Committee

7. Dr. B. C. Sen, *Chairman*
,, J. P. Ganguli, *Secretary*

Members :—

1. Dr. Harkirath Singh Dhupia.
2. ,, P. K. Ghose.
3. ,, G. P. Varma.
4. ,, P. L. Nirula.
5. ,, R. S. Mishra.
6. ,, K. S. Sethna.
7. ,, H. Sen.
8. ,, T. N. Ghose.
9. ,, C. P. Chaube.
10. ,, B. Bannerji.

THE ELEVENTH ALL-INDIA MEDICAL CONFERENCE—1934.

Resolution Committee

The Subjects Committees of the past All-India Medical Conferences have generally felt that there could have been a considerable saving of time, if a priliminary scrutiny of the various resolutions tendered by the branches of the Indian Medical Association, or by the bodies affiliated to it, or by the delegates to the Conferences, had been effected. Keeping this in view, the Reception Committee for this year's had been effected. Keeping this in view, the Reception Committee for this year's Conference has set up, with the approval of the Honorary Secretaries of the Indian Medical Association, a Resolutions Committee to survey, and where necessary amend or collate such resolutions as are forthcoming for this year.

As this will involve a fair period of time, it is earnestly requested that delegates will please forward all resolutions at the earliest date possible, and in any case not later than the first of December. At least two copies of each resolution should be sent, by preference to the undersigned. Resolutions can also be sent to the General Secretary, Reception Committee, Delhi ; or to the Secretary, the Indian Medical Association, Calcutta. The receipt of resolutions forwarded directly to the undersigned will be acknowledged within four days to the sender, kindly note this to prevent future complaints.

All resolutions will be submitted in their original—and where amended—also in their altered forms to the Subjects Committee whose decision will be final Resolutions approved by the subjects committee will alone be placed before the General Meetings of the Conference.

C. P. Chaube,
Hony. Secretary.

Rules and bye-laws for the Annual Medical Conference as passed at the XXVII meeting of the Central Council of Indian Medical Association held at Calcutta on the 14th July 1934 :—

Resolved that :—

*1. ALL REGISTERED MEDICAL MEN will be entitled to be delegates of the Conference on payment of certain scales of fees. They will be entitled to vote and take part in the Conference. Those practitioners who are already members of the Indian Medical Association directly or through its branches will pay Rs. 5/- as delegation fee each and those medical men who are not members of the Indian Medical Association will pay a delegation fee of Rs. 8/- each. Besides the above those who do not want to be delegates of the general conference may be delegates of the Scientific Section only on payment of Rs. 5/- each and take part in the proceedings of the Scientific Section, bonafide medical students shall also be entitled to be visitors on payment of Rs. 2/- each as admission fee but shall not be allowed to take part in the discussion.

Scientists who are not medical men will also be entitled to be delegates and take part in the Scientific Section on payment of a delegation fee of Rs. 5/- each.

Half of the delegation fees realised from the above categories should go to the local branch to meet the expenses of the conference and the remaining half is to be credited to the funds of the Central Council of the Indian Medical Association.

2. Subjects Committee of the Conference shall be elected as follows :—

Not more than 10 be elected by the Reception Committee.

Not more than 10 be elected by the Central Council.

Not more than 10 be elected by the delegates present at the Conference.

The President elect, Past President, Secretaries, Indian Medical Association, Secretary of the Reception Committee and Chairman of the Reception Committee to be ex-officio members of the Subjects Committee.

3. President elect of the Indian Medical Association for the ensuing year shall be the President of the Conference.

4. The Local branch of the Indian Medical Association inviting the Conference shall elect the Organising Secretary of the Conference.

5. The Chairman of the Reception Committee and other office-bearers shall be elected by the Reception Committee as a whole.

* Medical practitioners possessing registrable qualifications.

CENTRAL COUNCIL, I. M. A.

Proceedings of the XXVIII Meeting of the Central Council of the Indian Medical Association held at 67, Dharamtala Street, Calcutta, on the 6th October, 1934.

Members present :—Rao Bahadur Dr. J. P. Modi,
Dr. S. C. Sen Gupta.
Dr. D. P. Ghosh.
Dr. S. P. Sen Gupta.
Dr. A. D. Mukherjee.
Dr. A. K. Chakraberti.
Dr. G. Mukherji.

Rao Bahadur Dr. J. P. Modi took the chair.

1. Proceedings of the last meeting held on the 13th July 1934 were confirmed.

2. In accordance with Rule 22 and 23 circular was issued to all the branches for the final voting for the Presidentship and Vice-Presidentship of the Association for the next year. Resolved that Col. Bhola Nauth having secured the largest number of votes be declared, under Rule 22, the President-elect of the Association for the year 1935 and of the XI All-India Medical Conference to be held at Delhi in December, 1934 and that by the majority of votes Dr. S. N. Kaul, Dr. G. Da Silva and Capt. P. B. Mukerji be elected Vice-Presidents of the Association for the year 1935 under Rule 23.

3. Letters dated the 3rd October 1934 from the Secretary, Delhi Branch and Dr. S. C. Sen and a telegram of the 4th October from

the Secretary, Delhi Branch were discussed in the meeting, and it was resolved that the interpretations of the bye-laws (4) and (5) of the Annual All-India Medical Conference do not preclude the Organising Secretary of the Conference from being elected as Secretary of the Reception Committee, but the interpretations are also clear that the Organising Secretary does not automatically become the Secretary of the Reception Committee. Resolved further that a reply to this effect be sent to the Secretary, Delhi Branch.

4. Read a letter dated the 15th September 1934 from the Secretary, Meerut Medical Association. As suggestions from most of the branches and members of the Central Council have not been received, consideration of this item be deferred till the next meeting of the Council and that the branches and members who have not forwarded their opinions yet be requested to do so early.

5. Resolved that the Central Council of the Indian Medical Association records its deep sense of regret at the sad and sudden death of Dr. Mrigendra Lal Mitra, one of the eminent Surgeons of Calcutta and a member of the Indian Medical Association and that a letter conveying the above resolution be sent to Mrs. Mrigendra Lal Mitra and other members of the bereaved family and that a copy of the letter be sent to the press.

6. The Secretary, Bengal Branch reports that it is alleged that one of the members of the Bengal Branch got a clerk of the Journal Department to issue a letter to the press in the name of "G. Mukherji", Secretary, Bengal Branch. Resolved that the matter be referred to the local General Secretary of the Indian Medical Association for the necessary disciplinary action.

Sd. K. S. RAY,
Jt. Hon. Secretary,
I. M. A.

67, Dharamtala Street,
Calcutta.
12*th October* 1934.

Copy of Resolution No. 1 passed by The U. P. Provincial Medical Conference held at Meerut on 11th and 12th October 1934.

Resolved that a Provincial Branch of the Indian Medical Association for the United Provinses be found,

Proposer :— Dr. Bhupal Singh (*Meerut*).
Seconder :— Dr. Kunj Behari Lal (Meerut).
Supporters :— Dr. S. K. Chowdhury, (Benares).
By representatives of all the associations, who were present.

R. C. Roy,
Hon. Jt. Secry.

INDIAN MEDICAL ASSOCIATION
(Branch U. P. Meerut)

List Of Office-bearers.

President :— Dr. S. N. Sen (Cawnpore).
Vice-President :— Dr. M. Atal (Lucknow).
Dr. R. N. Banerji, (Allahabad).
Dr. R. C. Mitter (Meerut).
Prov. Secretary :— Dr. Bhupal Singh (Meerut.)
Prov. Jt. Secretaries :—Dr. K. P. Bagchi (Agra).
Dr. Indra Narain Saxena Jhansi.
Dr. Capt. R. N. Bose (Meerut).
Hony. Treasurer :—Dr. Capt. S. K. Chowdhury, Benares.

and Representatives,

Sd. R. N. Bose

MEDICAL ASSOCIATIONS, SOCIETIES, ETC.

Medical Societies Associations, Union etc. are invited to make use of this section of the Journal. —Editor

BOMBAY MEDICAL COUNCIL

The following extracts from the summary of the proceedings of the meeting of the Bombay Medical Council held on the 3rd September 1934 are published for information :—

The Council proceeded to consider the conduct of Mr. Michael Simon Judas DeSouza, Retired Military Sub-Assistant Surgeon, in giving two incorrect certificates to two passengers, wishing to sail ex-India, to the effect that they had been re-vaccinated by him on 28th April 1934, whereas they were actually not in Bombay on that date and thus rendering himself liable to be proceeded against for infamous conduct in a professional respect.

The Council held that Mr. DeSouza had been guilty of infamous conduct in a professional respect and the Registrar was directed to remove Mr. DeSouza's name from the Bombay Medical Register.

The Council proceeded to consider the conduct of Mr. Ganpat Subrao Kasyapi, L. M. & S., in completing and submitting on 23rd July 1933 *Post-mortem* Examination Reports on 3 dead bodies received by him for the purpose on the same day from the Police and answering every one of the several questions laid down in the form of Report regarding the different parts, internal and external, of the bodies, whereas he had actually not opened any of those bodies, so that the detailed information given by him as to the internal organs of the bodies must have been untrue to his knowledge, and thus rendering himself liable to be proceeded against for infamous conduct in a professional respect.

After hearing the Counsel by whom the practitioner was represented and after some deliberation, the Council decided to postpone the further consideration of the case to a session of the Council to be held after a year.

The Council resumed consideration of the application made by Mr. B. H. Bhatt, M.B.B.S., for the restoration of his name to the Bombay Medical Register and, after taking into account the legal opinion obtained as to the exact powers of the Council in dealing with such matters, agreed that the resolution previously adopted by the Council approving the restoration of Mr. Bhatt's name to the Register should stand.

The Council considered the suggestions made by the Executive Committee regarding the examinations to be visited by the Visitors appointed for the purpose by the Council at its last meeting and approved the proposal that 2 Visitors should visit all the examinations to be held next for the L.C.P.S., of the College of Physicians and Surgeons of Bombay.

The Council considered suggestions received from Capt. C. V. Thornton, R.A.M.C. (Retired), Mr. M. N. Talati, L.C.P.S., a member of the Bombay Medical Council, and the Chairman of the meeting of the Medical and Dental Professions of Bombay held on 18th March 1934, regarding prohibition of non-nationals from practising in India, and it was resolved that the question raised by them be referred to Government.

THE Dr. B. S. SHROEF MEMORIAL GOLD MEDAL

OF THE

BOMBAY MEDICAL UNION

The following subject has been selected by the Bombay Medical Union for competitive thesis for the above Prize for 1934 :—

"Old and new Remedies in the Treatment of Malaria"

The award will be in the form of Gold Medal called the Dr. B. S. Shroff Memorial Gold Medal of the Bombay Medical Union.

The competitor must be (i) a duly qualified member of the Medical Profession holding a degree or degrees and diplomas from Indian and other Universities created by statute, or (ii)

a duly qualified member of the Medical Profession holding the diploma of Membership of the College of Physicians and Surgeons of Bombay.

The thesis must be sent in six typed copies so as to reach the Honorary Secretaries, Bombay Medical Union, Blavatsky Lodge Building, French Bridge, Chowpatty, Bombay, on or before the 2nd January 1935, the latest.

The thesis should be designated by a motto instead of the writer's name, and should be accompanied by a sealed cover containing the name of the writer and his Post Office Address.

The name of the Prize, the year of competition, the subject of the thesis and the writer's motto should be superscribed on the cover.

No study or essay that has been published in the medical press or elsewhere will be considered eligible for the Prize, and a contribution offered in one year will be accepted in any subsequent year unless it includes evidence of further work.

The accepted thesis shall be the property of the Bombay Medical Union.

All other thesis shall be returned if not accepted provided the return postage expenses are paid in advance by the writer.

In the award of the Prize to the successful candidate, the decision of the Committee, shall be final.

SORAB. J. POPAT,
M.B., B.S.,
M. B. THAKORE,
M.B., F.R.C.S.E.,
Hon. Secretaries,
BOMBAY MEDICAL UNION

BURMA PRIVATE MEDICAL PRACTITIONERS ASSOCIATION

Copy of the resolutions passed at a Special Meeting of the Burma Private Medical Practitioner's Association, held on the 10*th March* 1934.

RESOLVED :—

1. That this Association approves and supports the decision of the Burma Legislative Council in declining to sanction the proposal of the Government of Burma to legalise the sale of ganja.
2. That it is the considered opinion of this Association that the sale of ganja through Government or any other agency is highly objectionable and detrimental to the public welfare.
3. That this Association learns with great regret that there is a large volume of illicit traffic in ganja ; and in the interests of the physical, mental, and moral well-being of the people of this province, strongly urges on the Government of Burma to make every effort to suppress the same.
4. That copies of these resolutions be sent to the Burma Medical Council, the Indian Medical Council, the Indian Medical Association, all the Chambers of Commerce in Rangoon, Mr. S. A. S. Tyabji, and other members of the Burma Legislative Council, the League of Nations, and the Press.

CORRESPONDENCE

MEDICAL COLLEGE CENTENARY

To

The Editor,
THE JOURNAL OF THE
INDIAN MEDICAL ASSOCIATION.

Dear Sir,

My Committee will be grateful if you would kindly publish this appeal in the earliest issue of your esteemed Journal.

"The Medical College Centenary celebration will occur on January 28th to 31st, 1935. In this connection it is very desirable that the members of the staff of the College and former students should come forward with medical papers to be read at the morning session on the 29th, 30th and 31st. Such papers should be either (*a*) papers dealing with the history of the college and its development ; or (*b*) brief medical papers of practical interest in such subjects as medicine, surgery, gynaecology, ophthalmology, etc., It would also be desirable to exhibit interesting clinical cases.

May I appeal to you for help and collaboration in this matter ? As the time will be limited, papers should be brief, or capable of abstracts only being read.

In addition to the reading of papers and showing of clinical cases, it has been decided to have a medical exhibition which will probably be housed in the Pathology and Physiology departments.

In this connection I would again appeal for your help and collaboration. Exhibits should be, as far as possible, self-explanatory with clear letterpress, and, as the amount of accommodation is limited, only the very best and most suitable materials should be exhibited.

As the programme has to be prepared well ahead, may I ask for an early reply ?"

Yours faithfully,
M. N. DE,
Secy. and Convenor,
Scientific subcommittee,
Medical College Centenary

To

The Editor,
JOURNAL OF THE
INDIAN MEDICAL ASSOCIATION.

Sir,

In connection with the Centenary of the Calcutta Medical College to be commemorated early next year, it is proposed to compile a volume giving a history of the origin and growth of this Institution which has played such a large part in offering modern medical education and medical relief during the last 100 years. The compilers have tried their best to get together a connected link of history and progress. Thinking that some old students or their decendents might enlighten us with old records, certificates of merit or protographs connected with the Institution, we take the liberty of appealing to all such gentlemen or ladies to communicate with me indicating the nature of such records.

Yours faithfully,
A. C. UKIL,
Secy. & Convenor,
Centenary Volume Sub-Committee,
Medical College Centenary.

Secretary's Office
Medical College Hospitals,
Calcutta the 30th Sept. 1934.

MEDICAL NOTES AND NEWS

[Item of news and notes of general interest to the profession for incorporation in this section from the members of the profession will be greatly appreciated—EDITOR]

JAPAN'S GREATEST MEDICAL MEETING

The ninth general meeting of the Japan Medical Society was held April 1-5, after an interval of four years, at the great hall of the Tokyo Imperial University, with Dr. Tatsukichi Irisawa in the chair ; 5,620 members were present and 2,512 papers were read, of which 159 papers were read in the section on microbiology and 158 in the section on pathology. These two sections were the first in number of papers. It was the greatest medical meeting ever held in this country. A number of guests from China proper, Manchuria and India delivered addresses.

THE BEST AGE AT WHICH TO MARRY

Become a father at 30 or a mother at 24 was the advice given by Mr. Shigeru Ohotomo of the Osaka Educational Research Institute before the Society of Applied Psychology at the Kyoto Imperial University. At those ages, one's chances of having brilliant children are 94 out of 100. Mr. Ohotomo studied 12,104 primary school children in Kobe and graded the pupils into five classes of intelligence. He found that the majority of boys that had the highest grades had 30 year old father and 24 year old mothers. The ages of the parents of the girls having the highest grades varied a little from those of the boys. Those girls usually had fathers aged 39 and mothers of 26 or 27 when they were born. Children with low intelligence rating often had parents of advanced ages. Another deduction made by him was that the difference in age between husbands and wives had a great bearing on the intelligence of their children. He said that 45 per cent. of the children in the highest group had parents whose ages differed from four to seven years.

ADMISSION OF WEALTHY PATIENTS TO CHARITY HOSPITALS STOPPED.

The admission of wealthy patients to the hopitaux de l'Assistance publique was the subject of an important session of the municipal council of Paris. The grievances of the medical profession were ably supported in vigorous attacks on Mr. Mourier, director of the Assistance publique, for granting favours to wealthy patients in hospitals under his control. Formerly, consultations and hospitalization were given only to persons registered in a charitable organization. Since the war, conditions have changed.

* * * *

The council passed a resolution that no more patients be admitted to the city hospitals without presenting evidence of indigence, either a card showing that they are out of work or have social insurance, or without presenting their income tax book for inspection, in order that persons who have sufficient funds to pay their physician may be eliminated, an exception being made in emergency cases due to accidents occuring on the public highways. If a charge of fraud can be established, a fine will be imposed representing twenty times the normal fee.

A LAW ON THE CUMULATION OF MEDICAL POSITIONS (RUMANIA)

The principal paragraphs of a new law are as follows : No one shall be allowed to fill more than one position that pays a salary, wage, daily or extra allowance by the state or by a county, parish, monopoly, sick club or similar institution, the budget of which are subject to the approval of the government, a country, a city or a clerical suzerainty. Scientific staffs, adjuncts, assistants and junior dressers who work at scientific institutes and devote their whole time to scientific work, without practicing, may occupy a second salaried position. Any official physician may occupy other paid positions if these are not declared incompatible with the law and the sum total of his pay does not exceed 16,000 lei monthly (about 150 dollars). Disobedience to the law will be punished with loss of positions and also a fine

of three times the amount of the illegally received annual payments.

THE EXPLOITATION OF PHYSICIANS

Owing to the economic crisis, which is made worse by the even increasing work of the socialization of medicine, there has been some agitation of the socialization of medicine, there has been some agitation among physicians of the large Brazilian cities to find a means to diminish the exploitation of physicians. Gratuitous medical services exist in all kinds of associations, in so called orders, having thousands of members, which are in fact rich corporations that pay small fees to physicians. Besides the Brazilian Medical Syndicate, which aims to defend the interests of the profession, a large number of young physicians have decided on an intensive campaign to serve better the medical class. They held well attended meetings in an effort to vindicate the physicians harmed by those who try every means to exploit the medical profession. This campaign of the young physicians is awakening much sympathy. It aims at uniting the interests of a noble profession against the constant and increasing exploitation of rich societies that remunerate physicians in an insignificant way for their services.

(Jour. Amer. Med. Asson., June 9, 1934.)

INTERNATIONAL CONFERENCE ON VITAMIN STANDARDIZATION

The second international conference on vitamin standardization has been held in London under the chairmanship of Dr. Edward Mellanby F.R.S. All the great countries, excepting Germany, were represented. Dr. Nelson represented the United States. The conference was remarkable for two things. The conclusions were unanimous, which can be explained by the fact that all the members were experts, and Sir Henry Dale, F.R.S. of the Permanent Standards Commission, suggested that all having editorial influence with any journal should bring pressure to bear so that all papers on vitamins, in which units other than the international were used, should be refused. The following recommendations for standardization await confirmation by the Permanent Committe on Biological Standardization.

Vitamin A

Pure beta-carotene, of melting point 184° C. and optically inactive, is recommended in place of impure carotene, provisionally adopted before. The previous unit was 1 microgram of the standard carotene. Beta-carotene is more active and so the corresponding amount is 0.6 microgram. Cocoanut oil has proved so satisfactory a solvent that distribution of the pure carotene in solution is recommended, to avoid the difficulties which workers have with the crystalline material. As a subsidary standard, a sample of cod liver oil, the potency of which in international units has been well established, is recommended. A spectrophotometric test measuring the coefficient of absorption at 328 millimicrons in strictly defined circumstance is held to be a satisfactory measurement for vitamin A in liver oils and concentrates.

Vitamin B

The adsorbate on acid clay, previously adopted, has been found most satisfactory and is therefore recommended.

Vitamin C

Like vitamin A, vitamin C can be prepared as a pure substance. The lemon juice previously adopted as a standard is therefore abandoned and l-ascorbic acid, as defined by physical constants, takes its place.

Vitamin D

The old standard of viosterol in olive oil has been found quite satisfactory. No advantage was to be gained at present by attempting to substitute for it crystalline vitamin D. There is still a large stock available. Provision was made for such an ultimate change when it should appear desirable. But one trouble has arisen. It has recently been found that animals do not all utilize different antirachitic materials in the same proportions. Thus cod liver oil is much more potent than viosterol tested on chickens than when tested on rats. Therefore

a much larger number of units would be attributed to the oil if chickens were the test animals than if rats were. Possibly similar differences may exist in other animals. To define the animal to be used for the test is considered to be a defect of biologic standardization. Possibly further research will remove this difficulty.

OTHER VITAMINS

Pure lactoflavine as a standard for vitamin B2 was considered, but its use was held to be premature. There seemed to be no hurry in the matter as deficiency of vitamin B2 is not yet definitely connected with any disease or syndrome in man.

(*J. A. M. A., Aug.* 4, 1934).

DELHI MUNICIPALITY

Vital Statistics for the month of July 1934.

Births.—

The total number of births during the months under review was 1048 as compared with 1419 in the corresponding month of the preceding year. The birth rate was 36·19 against 48·64.

The total number of births during the months under review was 1048 as compared with 1419 in the corresponding month of the preceding year. The birth rate was 36.19 against 48.94.

Deaths.—

The total number of deaths during the month under report was 828 as compared with 629 in the corresponding month of the last year. The death rate was 28.59 against 21.72.

Infantile mortality.—

The total numbers of deaths among infants under 1 year during month under review was 271 as compared with 191 in the corresponding month of the last year.

Infantile mortality rate was 258.58 against 134.60

The higher death rate during the month under review as compared with the death rate of the corresponding month of the preceding year was mainly due to an outbreak of Malaria consequent upon the sudden cessation of rain for a period of three weeks. During the first week of July there was a heavy down pour of rain. For three weeks consequently (*i.e.* from 9th to 29th July) the rains had completely stopped and the water collections started breeding mosquitoes. Malaria was markedly present not only in this city but in all the surrounding places. The unusual climatic conditions of the month was apparently detrimental to the health and lives of the infants and young children There were higher incidences of illness and deaths from infantile diarrhoea and broncho-pneumonia among the younger populations.

Cholera.—

News of outbreak of cholera in epidemic forms of varying intensity poured in from several places of the neighbouring provinces. Delhi city was fortunate enough in having been spared from this scourge. Among the various necessary anti-cholera measures taken mention may be made of the following :—

1. Disinfection of wells.
2. A closer supervision over food shops.
3. Destruction of articles of food found unfit for human consumption.
4. Systematic visits to dharamshalas, serais and such other public lodging places with a view to find out whether any person coming from the infected areas had broguht the infection into the city.
5. Public were informed by means of newspapers and distribution of ishtihars on the various prophylactic measures that should be adopted to guard against the disease.
6. Public latrines etc. were disinfected.

Typhoid Fever.—

In my reports on the causation and prevalence of typhoid fever in Delhi City I had detailed the various reasons that led to epidemics of typhoid fever, and actions required to be taken to protect the population against this scourage. It would be well to report here on actions taken so far.

Recommendations made by the Health Officer and approved by the Municipal Committee	Actions taken
1. Removal of water mains and pipes from sewers, drains, etc.	A list of 449 places whereat water mains and water pipes were detected passing through manholes or connection of sewers, drains, etc. From all these visible places the water mains and water pipes have been removed (vide remarks also against item 14.)
2. New sewers and drains not to have water pipes in them.	This is being looked to now.
3. Removal of scour valves from sewers.	The matter is being tackled.
4. Scouring of water mains.	This will be done when water supply is adequate.
5. Raising or removal of water hydrants from the ground level and drain sides.	Done at several places. Actions will be taken at other places also.
6. Removal of water taps from latrines and in close proximity of drains, etc.	No progress done in this matter. This work to be carried out properly will require an extra staff for house to house visits. Water taps are not allowed in privies etc.
7. Provision of concrete beds to sewers.	This is being done now.
8. Water samples.	Daily 2 samples and on every Friday 6 samples of water are taken from the different localities of the city and sent to the Public Health Laboratory for analysis. Since the removal of water mains and pipes from the manhole and connections of sewers and drains the results of water analysis have improved. (Vide also note against item 14). The Municipal Committee has recently approved of my suggestion to start a Water Analysis (Bacterological) Laboratory in the Town Hall. When this is accomplished a larger number of water samples will be analysed.
9. Supervision over new water connections and adoption of water supply Bye-laws.	This is being exercised by the Engineering Department.
10. Rechlorination of water.	During summer months (March to November) water is recholrinated at Hauz Qazi and Rang Mahal.
11. Plumbers to supply monthly lists to Engineering Department of water connections laid by them.	The Engineering Department is looking into this matter.
12. Provision of underground automatic flushing tanks at the heads of sewers and drains.	The Engineering Department is looking into this matter. The question of obtaining adequate supply of water is to be solved first.
13. Plans of underground sewers and drains.	They have not been received as yet.

Recommendations made by the Health Officer and approved by the Municipal Committee	Actions taken
14. Invisible underground spots of water contamination.	With the work of laying new water mains in progress, at several places the ground opened up showed that the old water main and pipes were in corroded and leaky state and running in close proximity to cracked underground drains and sewers within polluted sub-soils. To mention some of these places whereat such defects were noticed are Paharganjm Original Road, Gali Pipal Wali, Machhliwalan, Ajmeri Gate Bazar and others. Such invisible or hidden under ground spots of contamination can be located in one of the two ways, viz., (a) by dissecting out all the pipe which is practically an impossible task to achieve. (b) by showing in every detail the exact course of (i) watermains and pipes and (ii) sewers and drain-pipes on a plan of every locality of the city and from this to ascertain the exact places whereat water-mains or pipes, and sewers of underground drain pipes cross one another or run together in close proximity and then to open out for examination only such places. Detailed plans both of sewerage and water supply mains and pipes for the city are still awaited. NOTE :—Samples of water pipes recently removed by the Engineering Department are placed on the table. It will be seen that they have been eaten through at places and have been in close contact with the polluted sub-soil.
15. Protection of food supply ..	Food byelaws, milk, cattle, stable, byelaws etc. are strictly being enforced.
16. Removal of dumping grounds ..	This question is being seriously tackled. "The Refuse Train Scheme" is now before the Government.
17. Education ..	Ishtihars on prevention of typhoid fever were periodically distributed and Health Boards used as travelling exhibits.

ASSAM COUNCIL OF MEDICAL REGISTRATION

(No. 2469 L.S.G.S.) In exercise of the power conferred by Section 11 of the Assam Medical Act, 1916 (Assam Act 1 of 1916), the Government of Assam are pleased to declare the term of office of the following members who have been nominated or elected to constitute the Assam Council of Medical Registration under sections 4 and 5 of the said Act, shall begin on the 11th June 1934 :—

1. The Inspector General of Civil Hospitals, Assam — *President.*
2. The Director, Pasteur Institute and Medical Research Institute, Shillong — *Member nominated*
3. The Director of Public Health, Assam — ,,
4. The Civil Surgeon, Khasi and Jaintia Hills — ,,
5. The Chief Medical Officer, Welsh Mission Hospital, Shillong — ,,
6. Dr. Brajendra Nath Bhattacharyya, M.B. — *Member nominated*
7. Dr. F. C. McCombie, M.D.B.S., M.R.C.S., L.R.C.P. — ,,
8. Dr. Lalit Kumar Barooah, L.M.P. — ,,
9. Dr. G. D. Madhok, L.R.C.P. & S., L.R.F.P. & S., L.M., D.P.H., D.T.M. — ,,
10. Dr. Kumudini Kanta Banarji, M.B. — *Member elected.*
11. Dr. Dibakar, Hazarika, M.B. — ,,
12. Dr. Sarat Chandra Chakravarty, L.M.F. — ,,
13. Dr. Bimal Ranjan Dey, L.M.F. — ,,

A CENTENARY APPEAL
FOR
THE MEDICAL COLLEGE HOSPITALS
CALCUTTA

The following appeal has been issued by Sir Bijoy Prosad Singh Roy, Minister for Local Self-Government, Bengal, on behalf of the Medical College Hospitals, Calcutta :—

The Calcutta Medical College will be celebrating its centenary early next year. It was established by Lord William Bentinck by an Order-in-Council dated January 28, 1835. About fifty years ago the number of indoor cases treated were 2,325, outdoor cases 35,484. The confinements in the hospital were only 55. The corresponding figures for 1934 were indoor cases 15,931, outdoor 162,243 and over 2,000 confinement cases. Such has been the growth of the Medical College Hospitals from its small beginnings when the first clinical hospital attached to the College consisted of 30 beds and a small outpatient dispensary. To-day the Medical College and its associated hospitals have expanded into an immense institution dealing with practically all branches of modern medicine and providing incalculable benefit not only to Calcutta but also to Bengal and even beyond. During this 100 years many distinguished men attached to the College have made notable contributions to the advancement of medical science particularly as regards tropical diseases.

Much money is now needed to modernize the Calcutta Medical College Hospitals and among its many pressing requirements is the abolition of the present unsatisfactory arrangements in the emergency rooms by the construction of a proper casualty department and wards with up-to-date equipment and adequate nursing arrangements. The recurring expenditure of this department amounting to Rs. 25,000 per annum the Government have decided to bear, provided the capital cost for the building and equipment can be raised through public donations. Even this will not suffice to bring this institution to the standard of a modern hospital organisation. Much still

remains to be attained if it is to maintain its position as a pioneer. An outstanding example in this respect is its deficiency in radium.

In matters of public charity, especially with regard to medical aid and medical education, Bengal has been in the past a leader to the rest of India, and has built up a tradition of splendid and efficient service. The services of Bengal in this direction have received widespread appreciation. The Calcutta Medical College and Hospitals now appeal to the generosity of Indians and Europeans alike, and also to the several generations of medical men who have passed out through their doors with success, and who now hold prominent positions in various spheres of life in India. The financial needs are very urgent, and, despite the present financial stringency, we do not believe that this appeal will be in vain. There is no subject which should be closer to the heart of a country than the health and welfare of its people.

Donations may kindly be sent either to the Treasurer of the Imperial Bank for credit to the Medical College Centenary Fund or to any of the following gentlemen :—

Sir Badri Das Goenka, KT., C.I.E., 145 *Muktaram Babu Street, Calcutta*; Sir Hari Sankar Paul, Kt., 1 *and* 3, *Bonfield Lane, Calcutta*; Kumar H. K. Mitter, 1. *Jhamapukur Lane, Calcutta*; Mr. J. N. Basu, *Temple Chambers*, 6. *Old Post Office St., Calcutta*; Mr. Satish Ch. Mitter. 2, *Loudon St., Calcutta*; Mr. Sudhansu K. Mitter, 34/1, *Elgin Road, Calcutta*; Dr. Charubrata Ray, 13, *Hindusthan Road, Calcutta*: or Lt.-Col. T. C. Boys, *Principal's House, Medical College, Calcutta.*

The signatories to the appeal include :—

Bijoy Prosad Singh Roy, Rabindra Nath Tagore, Prodyot Kumar Tagore, Deva Prosad Sarbadhikary, M. N. Roy Chowdhury of Santosh S. C. Nandi of Kashimbazar, Nil Ratan Sircar, E. C. Benthall, Badridas Goenka, Kedar Nath Das, Hari Sankar Paul, Hasan Suhrawardy, Upendra Nath Brahmachari, S. N. Mallik, Nalini Ranjan Sarkar, W. M. Craddock, Shyamaprosad Mukherji, S. D. Gladstone, C. G. Arthur, Chas. G. Cooper, H. H. Burn, P. N. Tagore. J. N. Basu, Moongtulal Thaparia, Arthur Moore, Tusar Kanti Ghosh, Promotha Nath Roy, Eric Studd, Haridhan Dutt, H. K. Mitter, Kamala Ranjan Roy, J. Reid Kay, G. D. Birla, D. P. Khaitan, D. C. Ghosh, Satis Chandra Mitter, M. A. H. Ispahani, D. J. Cohen, Kumar Krishna Kumar, M. A. Momin, Bimala Ch. Law, A. K. Fazlul Haq, S. K. Mitter, Ratan Mohan Chatterjee, D. P. Goil, Thomas Crawford Boyd, R. Knowles, L. M. Banerji, K. K. Chatterji, E. H. Vere Hodge, A. A. E. Baptist, Ekendra Nath Ghosh, N. Pan, P. Chatterji, K. S. Mitra, M. Ahmed, Jawalaprasad Bhartia and Kanailal Jatia.

OBITUARY

Late Dr. M. L. MITRA

Dr. MRIGENDRALAL MITRA, a well-known surgeon of Calcutta and a prominent member of this Association, died of heart failure at his residence in Park Circus on Friday, the 5th October, 1934.

DR. MITRA, who was an inhabitant of Burdwan, received his early medical education in Lahore. Early in his career he took up Government service and served in various capacities both in the Central Provinces and Bengal. While he was acting as Teacher of Surgery in the Campbell Medical School, Calcutta, he proceeded, on leave, to Edinburgh, where he obtained the F.R.C.S. degree.

After retiring from Government service in 1907, Dr. Mitra set up independent practice in Calcutta and was in the front rank of his profession. He joined the Calcutta Medical School and College of Physicians and Surgeons, Bengal, as a teacher in surgery. Dr. Mitra became professor of surgery and surgeon to the attached hospitals of the Carmichael Medical College, which posts he held till his death.

DR. MITRA was for several years a Fellow of the Calcutta University. He was a member of the Council of Medical Registration, Bengal, and the first secretary and founder member of the Calcutta Medical Association.

He was 67 years of age and is survived by his wife, three sons and three daughters.

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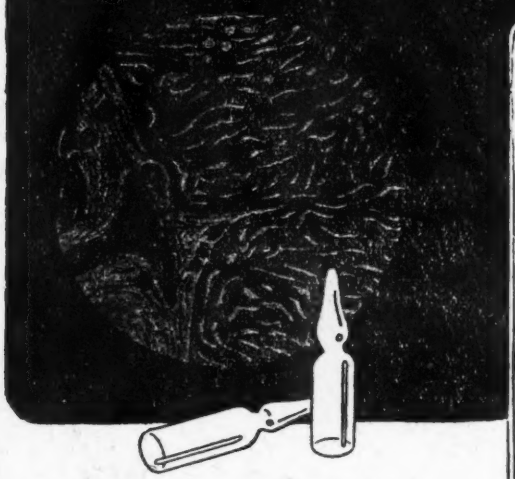

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